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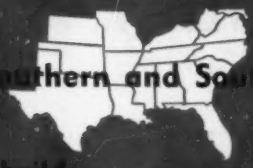

Serving the 18 Southern and Southwestern States

"New developments that help to build business"—new department on page 38

JANUARY, 1954

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Volume 34 Number 1

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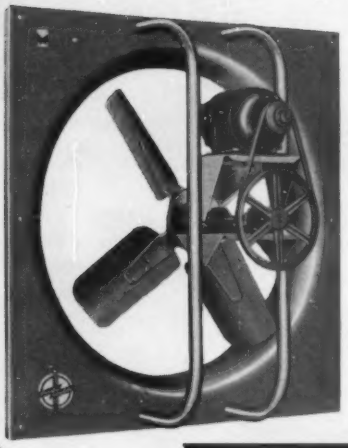

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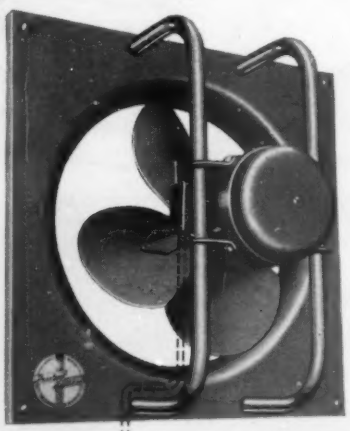

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SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

January, 1954 — Vol. 34—No. 1

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TO HELP THE BUSY READER—

Many special problems were encountered in the electrical installation recently completed for the huge airplane maintenance shops of Eastern Airlines at Miami. **Providing electrical flexibility** for such a diversity of operations and services taxes the resourcefulness of design engineers and contractors. **See page 18.**

In preparing and conducting a planned lighting campaign, the Kansas Gas and Electric Company has not overlooked the fact that the electrical contractor is one of the most important factors in every lighting installation. Their promotion shows **how contractors benefit from planned lighting program.** **See page 22.**

In these years of rapid change and greatly increasing loads, **long-range system planning** must not be neglected by utility engineers and executives. A comprehensive discussion of how to go about such planning and what to consider, begins on **page 26.**

Electrical problems and their remedies was the general subject of discussion when **Carolina plant engineers conferred** recently. Motor lubrication, control enclosures, grounding, and fusing were among the problems discussed. **See page 28.**

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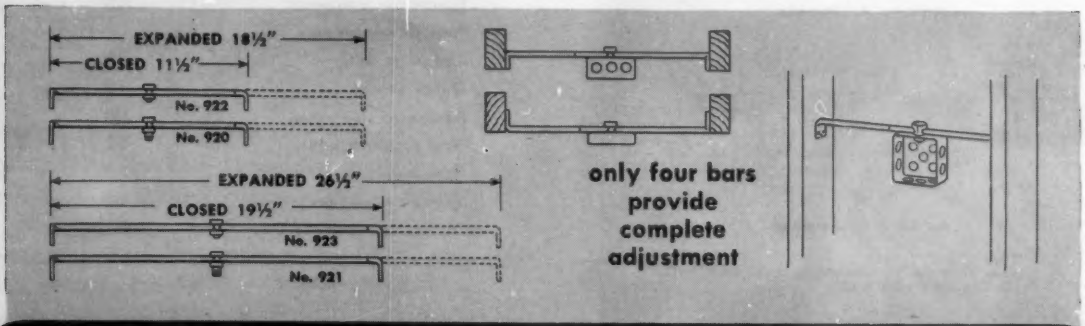

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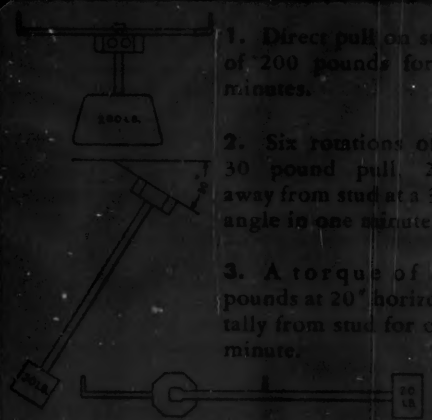

1. Direct pull on stud of 200 pounds for 5 minutes.

2. Six rotations of a 30 pound pull 20" away from stud at a 30° angle in one minute.

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Economic comment

by J. Whitney Bunting, Ph.D.

A time of prognostication

◆ THE NEW YEAR now upon the business men of this nation is filled with the comments and complaints of the hordes of prognosticators and prophets of economic change. This is truly a healthy sign, for it shows not only that the forecasters are thinking of our economic future, but also that there are thousands of business men who follow their reasoning with deliberation.

Of course, one need not agree with all prophets, but the immensity of the national economic machine does require careful thought and analysis. It is so easy to accept the workings of the economic system as "natural" during periods of prosperity and good times, such as we have encountered during the past several years, and thus lose sight of the fact that man, collectively, is responsible for America's economic success or failure.

Thus, problems may creep into the economy without due notice or attention of our experts. Such happened in the late nineteen-twenties, much to the discomfort of all concerned.

Give facts with prophecies

This is a plea, therefore, to let forecasters and prophets have full sway in reaching their decisions, but let such decisions be based on good economic logic with all the facts related thereto being published as well so that the businessman can assess true values.

Some might feel that such a course could lead to nothing better than pure chaos. They might point to the often-quoted, yet never-proved, theory that no two economists could agree upon economic matters. However, it is surprising how close many predictions will be in regard to broad general economic predictions.

The truth is that predictions to be of value must be based upon an analysis or review of facts that are generally known and available to all. Any discrepancy of conclusion or divergence of opinion depends upon the weight or importance given to the various factors or the degree of bias or personal opinion creeping into the conclusion-drawing process.

If all facts that have been used in reaching a prophecy are presented along with the prophecy, then the business man can analyze a variety of reports and reach a personal conclusion that will be of value in his personal economic affairs. Not only will such businesses benefit, but also real progress will be made in promoting improved thinking habits among businessmen.

Weigh your favorites

Every person that reads this column has some prophet or forecaster who appeals to his sense of reasoning, either because of personal acquaintance, or because the views expressed tend to be similar to his own customary judgment. Such dependence, however, unless based upon sound judgment, belittles the true value and importance of economic analysis and conjecture.

Let all the facts be known and all sources of information be tapped so that our economic opinions will be mature analyses of true data. In this way planning may be accomplished on a broad plane that will be beneficial to all concerned.

Labor Law in 1954?

Some observers have foretold a possible change in Taft-Hartley regulations next year, primarily as a political package to promote more Republican votes in the upcoming congressional elections. This thought has been expressed so often that it has almost been accepted as an inevitable event that will soon be upon the nation.

It would appear, however, that careful thought should be given to any step in this direction because, like any other political step, there are certain consequences that will arise. Most important of these is the reason given for the necessity of a change. Little is said now that the law is good, bad, or indifferent. The main premise seems to lie in political expediency for, it is argued, the Republicans cannot stay in control of Congress without organized labor support.

This has been quoted so often that people now take it for fact. Up to the present, however, there has been no true evaluation of either of the following:

(1) Importance of labor in organizing voting for any particular party or candidate in national or state-wide elections; and,

(2) Whether or not rank and file labor organization membership is truly in support of the anti-Taft-Hartley statements made by state and national officials.

No certain evidence

Both facts can only be estimated upon the basis of results in previous elections for one thing basic to the American political system is that we do have privacy of the ballot. An organized group may hope, and even expect, that the membership will support in an election the stated purposes of the group. But there is no guarantee of such action, nor can a check be made with any reasonable degree of accuracy.

With these questionable factors in mind, it is doubtful if any major labor law revision will take place. Some minor revisions can be anticipated as a part of Republican Party policy, but they will undoubtedly be so slight in weight that the law will still represent the thinking and policies of the late Senator Taft. His influence is still felt in national party planning, particularly in foreign and economic affairs.

Dr. Bunting, well-known southern economist, is president of Oglethorpe University, Oglethorpe, Ga.

a Simple Case of logic...

Sherardizing

is galvanizing at its BEST

so... **Sherarduct**

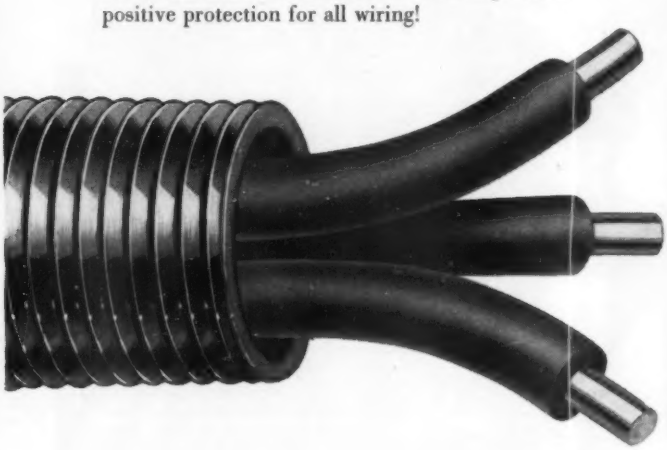
is galvanized conduit

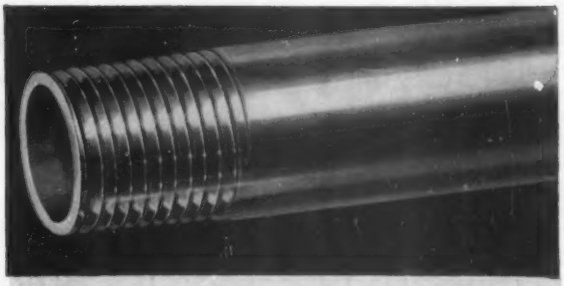
at its BEST

It's the *Sherardizing* process that fortifies Sherarduct—a *dry galvanizing* process that actually *alloys* corrosion-resistant zinc to the steel wall under heat. This is galvanizing at its best!

Sherardizing provides a 100 per cent uniform protective zinc coating over all surfaces, including the hill and valley of every single thread—safeguarding the conduit system against rust and corrosion for all time. *This* is Sherarduct, galvanized conduit at its best!

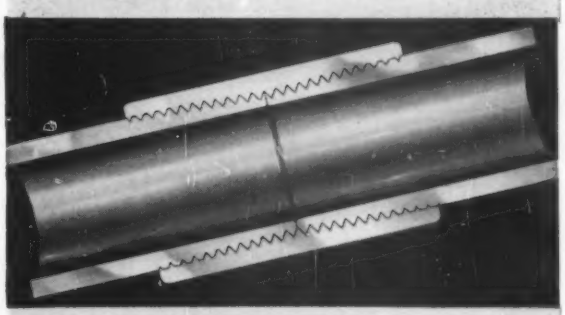
Still further protection is provided by the *baked-on* Shera-Solution, an alkyd-like enamel that seals the zinc against acids and other corrosive elements. Sherarduct Conduit provides positive protection for all wiring!





Threaded before Sherardizing

Sherarduct threads are cut *before*, not after, galvanizing. Even the base of the clean, sharp threads has *uniform, full zinc protection.*



Protection for Threads

Surfaces and threads of the Sherarduct coupling are fully zinc protected. Accurately cut threads permit butting of conduit within the coupling—provide complete protection of the entire conduit system.

Works easily . . . Fishes easily . . . Bends without flaking

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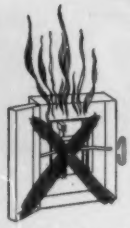

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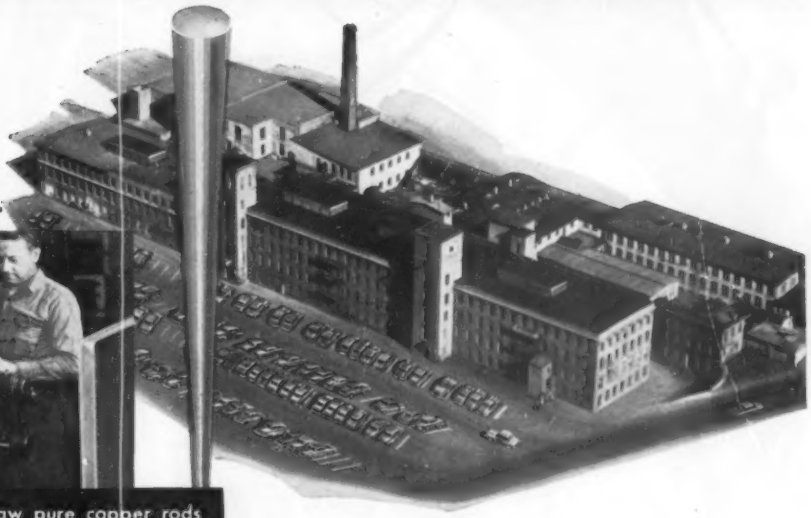

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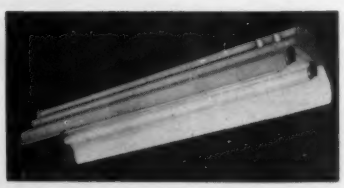

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THE MAGAZINE

For

SOUTHERN ELECTRICAL MEN

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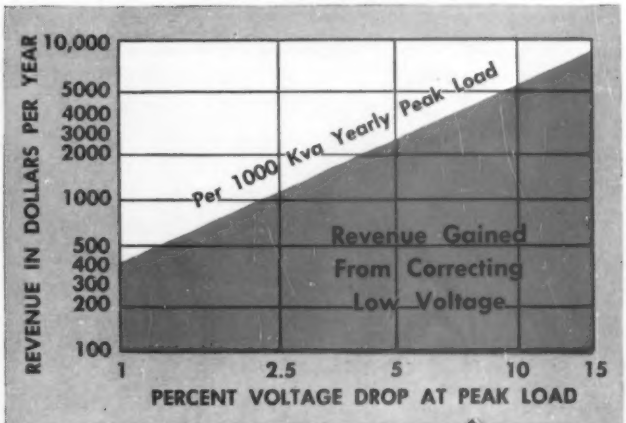

Assuming: 90% Power Factor; 40% Load Factor; 50% Lighting Load; Energy Charge: 3¢/kwhr; Average Lighting Load Drop — 70% of Peak Load Drop; You can interpolate directly for other loads.

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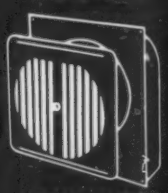
MODEL 880
for installation through ceiling and roof



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MODEL 847-1047
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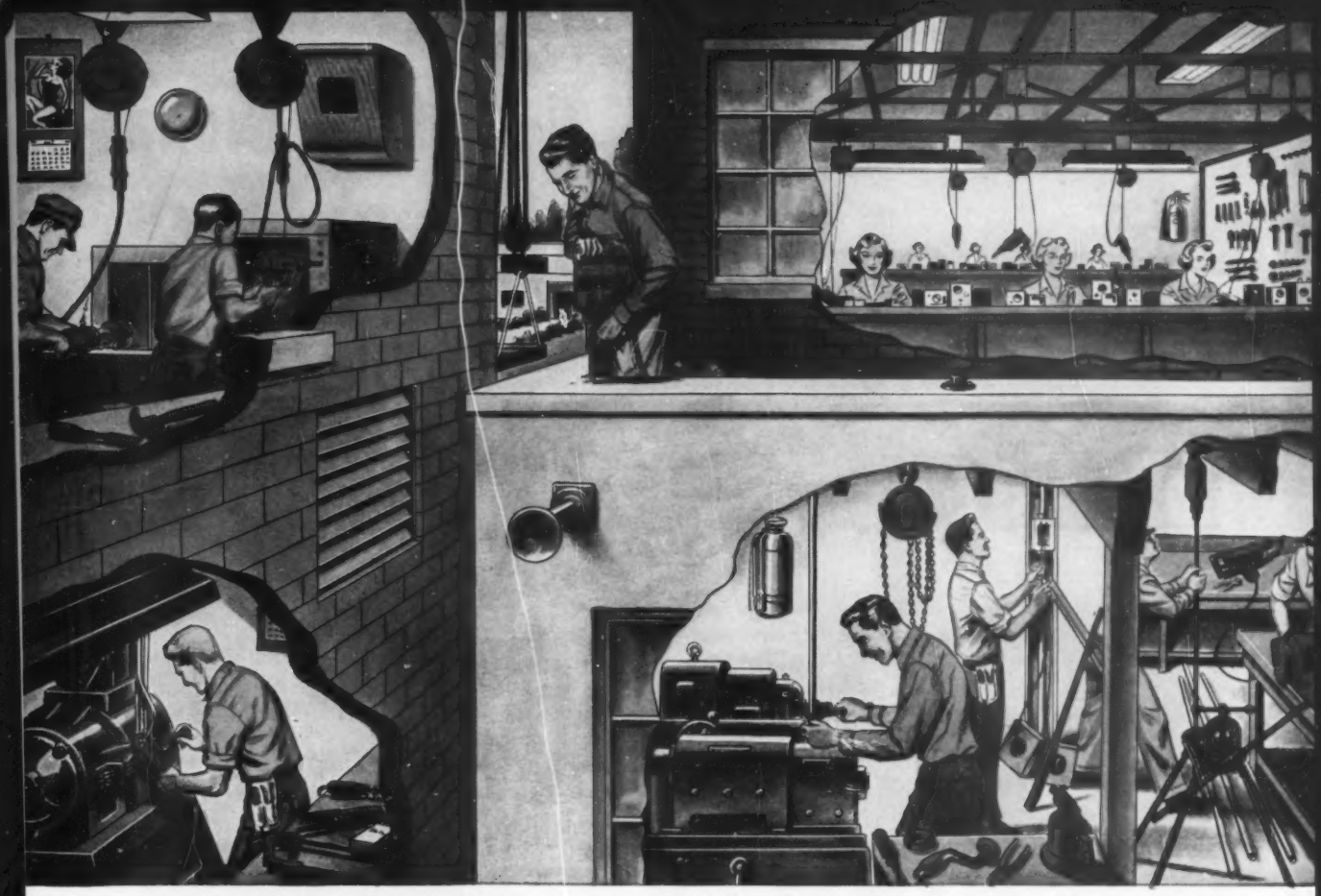

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HUSKY, LONG-WEARING THOR TOOLS are among the many quality electrical products distributed by Graybar. This ½" portable drill, for instance, provides stall-free operation even under the heaviest pressure, thanks to an extra-powerful AC/DC motor and gear train. Your own investigation of Thor saws, nut setters and other electric tools will prove their superior performance.

Better tools make better workers... work goes faster, and more smoothly with quality tools built for the job.

Check your tool inventory, today — then order the hand or portable power tools you need... via Graybar.

For, as with all of your electrical needs, Graybar offers a specialized service in their procurement.

- **Well known makes** — of proved design and construction for hard usage.
- **Availability** — via more than 100 strategically-located Graybar offices and warehouses.
- **One source... one responsibility** — through centralization of all order assembly, shipping, and billing functions.
- **Graybar Specialists** — men with years of experience in all of the major electrical fields to advise and consult with you and your customers.
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Only Duo-Guard provides

→ 1. FOR BRANCH CIRCUITS

→ 2. FOR LAMP and APPLIANCE CORDS

Duo-Guard Pushmatic circuit breakers give you double protection because they have separate thermal and magnetic elements. The Duo-Guard principle assures you that lamp and appliance cords, as well as branch circuits, are guarded from thermal and electrical faults.

No other breaker—at any price—has both:

Thermal Element (bimetal strip) protects branch circuit wiring and insulation, from Electri-Center panelboard to receptacle or outlet, from any kind of thermal overloads . . . and prevents nuisance tripping.

Magnetic Element (multiple-turn solenoid) provides instantaneous protection for lamp and appliance cords, from receptacles or outlets to all properly connected electrical equipment. Also protects branch circuit wiring.

Now the standard BullDog breaker, Duo-Guard Pushmatic has all the famous BullDog exclusive features: simple-to-operate push-button control; day or night identification of "OFF" breaker; bolt-tight installation. No other breaker offers as much . . . yet many cost more.

Get the complete story on the world's most efficient circuit breaker. Write, today, for new, free Bulletin PM-365. BullDog Electric Products Company, Dept. ES-14, Detroit 32, Michigan.

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Why Duo-Guard Pushmatics Provide Double Protection

BULLDOG

THOROUGHBRED IN ELECTRICAL EQUIPMENT

CONSULT THE FOLLOWING SOUTHERN REPRESENTATIVES

Walker Electrical Company, Inc.
70 Bennett St., N.W., P.O. Box 8, Section D
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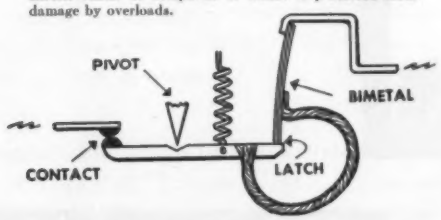
BullDog Breaker
double protection

DUO-GUARD

Duo-Guard Pushmatics are available in 15-, 20-, 30-, 40- and 50-ampere ratings: 1-pole, 120 V., A.C., Listed by Underwriters' Laboratories, Inc.

Simplified diagram of Thermal Element

As bimetal is heated by excess electric current, it bends and releases latch. Spring snaps latch upward, breaking contact. Branch circuit wiring, including insulation, from Electri-Center to receptacle or outlet is protected from damage by overloads.



Simplified diagram of Magnetic Element

Wound wire coil (solenoid) is energized by current. When short occurs, coil *instantly* activates metal plunger which breaks contact. BOTH BRANCH CIRCUIT WIRING AND LAMP AND APPLIANCE CORDS ARE PROTECTED FROM ELECTRICAL OVERLOADS AND SHORTS.

ELECTRIC PRODUCTS COMPANY

Wilson Electrical Equipment & Company
2930 Commerce Street, P.O. Box 1725
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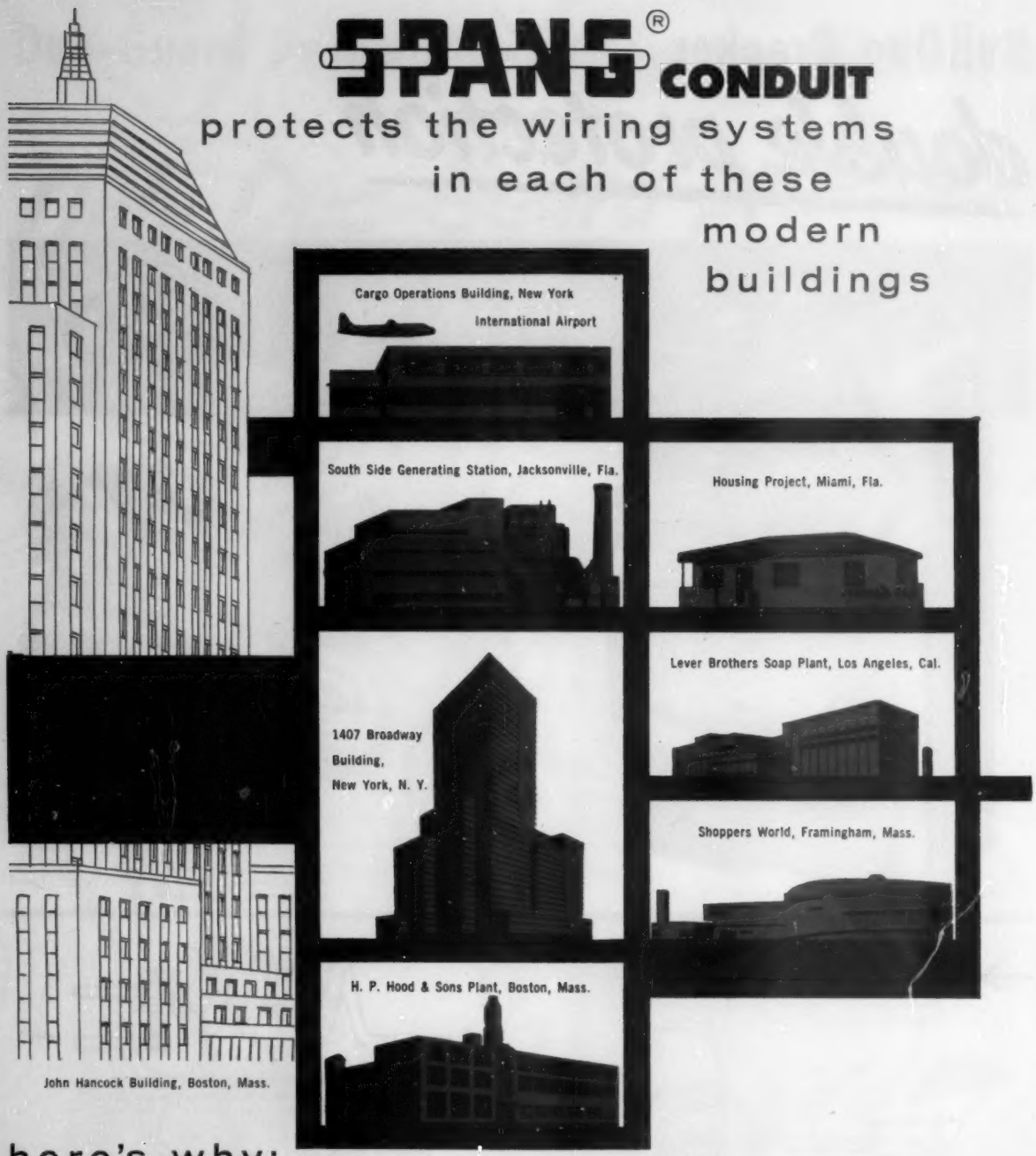
SPANG® CONDUIT

protects the wiring systems in each of these modern buildings


Cargo Operations Building, New York International Airport
South Side Generating Station, Jacksonville, Fla.
Housing Project, Miami, Fla.
1407 Broadway Building, New York, N. Y.
Lever Brothers Soap Plant, Los Angeles, Cal.
Shoppers World, Framingham, Mass.
H. P. Hood & Sons Plant, Boston, Mass.
John Hancock Building, Boston, Mass.

here's why:

Spang Conduit is the combination of top-grade steel and quality-controlled manufacturing which gives you conduit to fit any wiring needs.

Evidence of the wide demand for Spang Conduit can be found in the many types of buildings for which Spang exclusively has been specified. Whether it's an airport, a manufacturing plant, a power plant, an office building, a home . . . no matter what the type of building . . . architects and contractors find that Spang offers the conduit best suited for their needs.

Spang is easier to cut, thread, bend and weld, saving valuable time and money on conduit installation. Take your choice of any of the "big four" in a full range of sizes. Spang offers you Cenlaco, Central Black, Central White, and EMT with the SPANGLEAM Finish.

SPANG CONDUIT

SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE:
TWO GATEWAY CENTER, PITTSBURGH, PA.
District Offices and Sales Representatives in Principal Cities

We take the worry out of your communications

Your business is power. Growing rapidly . . . improving continually, it is extremely complex in itself. Why complicate it more?

Our business is communications; let us take over your communications worries. With the Bell System you get the best services available.

Here's why:

1. Communications have been Bell System's special business for more than 75 years. That's why we have the best equipment and skilled personnel to maintain and install it.

2. Bell System experts tailor your communications to fit your changing needs exactly—neither too much nor too little—whether it's private-line or mobile telephone or teletypewriter services; or channels for remote metering, protective relaying or supervisory control.

3. New developments and techniques are continually available to Bell System engineers in meeting your specific requirements.

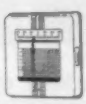
4. Your Bell System services are protected to assure reliability—alternate routings are an integral part of planning to meet any emergency.

Forget the headaches of investing capital for communications equipment. Ask your Bell Telephone Company to study your communications problems and needs. There is no charge for this survey.

PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE



METERING CHANNELS

BELL TELEPHONE SYSTEM

Providing electrical flexibility

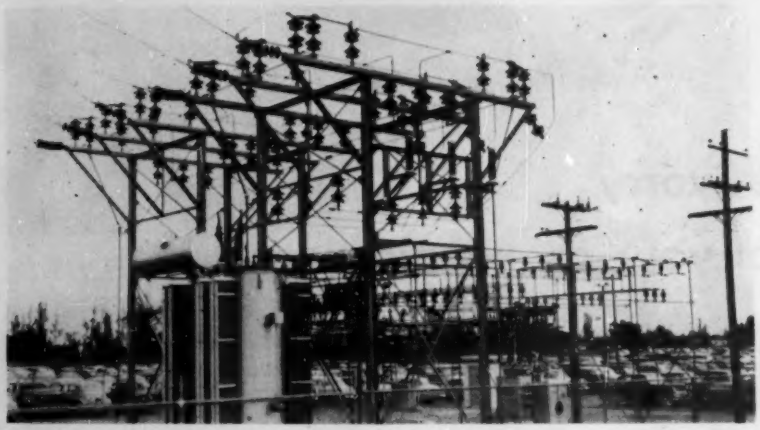
by Hal Newsome

◆ IN A DESIGN employing wireways around the ceiling perimeters of dozens of individual shops, for complete flexibility in meeting the constantly-changing power needs of modern airplane maintenance, Miller Electric Co., of Miami, recently completed what is believed to be the largest single electrical installation in the area, on the new maintenance building of Eastern Airlines in that city.

Believed to be the largest airline plane-servicing unit in the world, the building was constructed at a cost of $5,000,000, and is part of Eastern's $140 million re-equipment and expansion program announced recently by Captain Eddie Rickenbacker, chairman of the board. The electrical installation ran about one-tenth of the building cost.

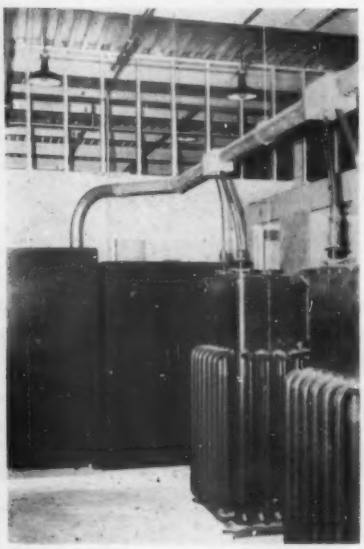
Joe Schmidt, manager of Miller's, feels that the job is notable for the wide variety of electrical services that are supplied in a durable,

Servicing one of the huge EAL Super Constellations requires lighting of the "bay" with daylight and a combination of mercury and incandescents. Artificial lighting penetrates into obscure places not reached by daylight.



A power company substation was installed to meet the increased load of the new Eastern Air Lines service building.

Transformer bank with busway distribution overhead gives an idea of the complexity of the maintenance building installation.



Switchboards are in the rear of this part of the transformer room. They are located behind the transformer bank.

for airplane maintenance

trouble-free and flexible design, using mostly standard units. Nothing was spent on electrical "frills," but no expense was spared in assuring safety, reserve capacity, efficiency and adaptability for future use. Close study by Eastern's own staff of the special requirements of airline maintenance helped the contractor to supply the various lighting arrangements and power voltage needs for these special applications. And this was accomplished at a reasonable cost with every indication of low maintenance expense.

The new three-story, T-shaped maintenance building covers six acres—448,748 square feet enclosed or under attached steel canopies—and has over 29 acres of concrete "ramp" space around it. This one building and ramp provide for the maneuvering and complete servicing of 40 Super-Constellations or other large airplanes by crews working around the clock in hundreds of complicated processes. It is a notable addition to Eastern's 100-acre Miami plant.

Service operations call for general lighting over the whole ramp area, and for special, brilliant, shadow-free illumination of 14 large covered, plane-service "bays" along the sides of the building, and of two bays and many shops inside. Conventional lighting of offices and storage space on the second and third floors is required. General illumination is on standard 110-volt service, with special lighting in the service bays on 220-240 volts, and all power requirements of over three hp on 220. Baseball floodlights are used at the run-up service positions around the edges of the field.

The wiring design was produced by Eastern's own staff and long-term consulting engineers from experience gained in putting up a similar building four years before, and from the many "growing pains" of the industry since that time. With plane design changing so rapidly, along with the myriads of new instruments, equipment and continuously - improving machines for testing them, the most modern service equipment is considered out-of-date in a few short years. For this reason, the staff concentrated on reserve capacity and maximum flexibility in electrical distribution. All equipment, from transformers through busway, wireways and outlets, are 33 to 50 per cent oversize. Standard units were used wherever possible for economy, speed of construction and ease of maintenance. Already the plant, just occupied in June, has passed the acid test by meeting a large, immediate expansion of operations long before it was expected, due to the sensational increase in air travel.

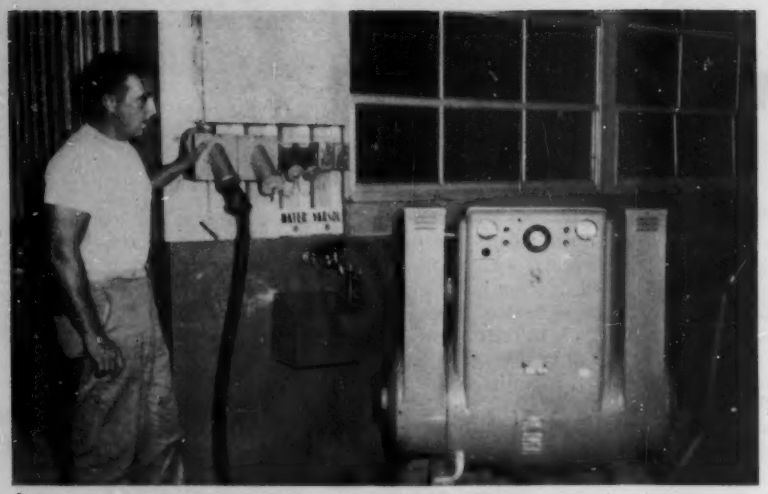
The electrical distribution starts with a loop circuit brought directly into the building area from the high-tension, 4160 - volt service from the new power company substation. The design called for 300 MCM neoprene - covered, 7,500 - volt cable to the transformers, the covering being specified because of a Florida worm which drills holes in lead cable—believe it or not!

The two banks of transformers

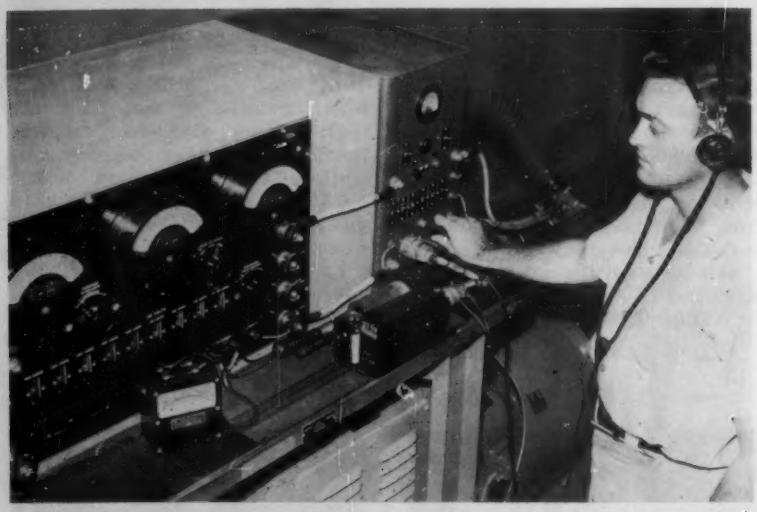
Hobart 1,000 - amp., 28-volt, d.c. motor-generator supplies inside shops with same voltage as planes have for testing instruments.

Mercury vapor lamp transformers are located underneath the distributing center. The mercury vapor lamps were grouped with incandescents.

Capacity of the main circuit breaker in the EAL maintenance building electrical system is 4160 volts and 4,000 amps.



Special explosion-proof outlets are three-phase 220-volt, single-phase 220-volt, and single-phase 110-volt.



200 amp. service is required by some machines, and 28-volt d.c. is required for all instrument testing stands to reproduce electrical conditions of a plane.

Service of 50 hp is required by hydraulic test stands which test several units at the same time on this test panel.

are located on the third floor, because the first floor is reserved for plane maintenance and heavy machinery and the second floor is designated for offices and other departments where accessibility is a factor. One bank consists of three 250-kva transformers, and the other of three 333-kva units. Either bank could handle the general lighting and also that of the 14 service bays in an emergency, but both banks are needed to operate the dozens of shops inside the building at full capacity.

Service leaves the transformers in three-phase, four-wire busway, with the transformers being delta-connected on the secondary side. The duct is tapped at each office and shop area, and in the latter the feeder runs on the ceiling around the edges of each room in Frank Adams four-by-four wireways, and from there to National 1700 surface duct. The main busway is fed through 2,000-amp. switches to runs of over 300 feet without breakers, and there was some doubt expressed by suppliers' representatives about the two 2,000-amp. switches on the secondary circuits being able to open in time to protect the system from short circuit. But engineers figured the short circuit and impedance values and decided the installation was safe, thereby saving several thousand dollars in cost.

Explosion-proof units used

Four banks of three 25-kva transformers, located around the edges of the ramp, are energized from a 4 kv circuit which they convert into 220-volts for the 22 plane - service, run - up positions. G.E. baseball floodlights are located *between* each two plane positions; and explosion-proof receptacles, at all service points both inside and out, provide both 110-volt and 100-amp 220-volt outlets for all tools and equipment, including jennies to test the planes' hydraulic system. 28-volt d.c. motor generators are used to activate the planes' electric systems for testing under simulated flying conditions.

The load of the building and ramp system is 2,050 kva, with 1,000 kva for lighting and 1,050 for power. Demand at present is

about 1,000 kva, with plenty of reserve for future needs as more departments are activated and expanded.

The 16 main panel boards make use of standard NTP units for 110-volt lighting, and "pull fuses" for the high-bay lights and power circuits. In all, there are 70 lighting panels and about 100 for power.

One of the most interesting features of the whole job is the special asymmetrical bank of color-corrected mercury vapor and incandescent lighting used overhead in each of the important "high-bays" along the edges of the building, where the big planes are given "progressive" or partial overhaul at regular intervals. These bays are 100 feet by 55 feet by 35 feet, with a height clearance of 30 feet to admit the big ships under shelter; and this height poses the problem of securing sufficient shadow-free illumination on the plane below, and especially in getting light under the wings and cowling and in all the difficult angles and contours. Even in the semi-open bays, in the daytime, there are surfaces which the natural light never hits directly.

Mercury lamps in banks

After months of experiment by the staff, with the aid of the Pittsburg Reflector Co., and Furna E. Lott, Miami illumination engineer, a broad V-shaped pattern was devised using 12 lights on four-foot centers on each side of the V. The latter is so broad that it roughly parallels the wing shape of the plane ten to 15 feet below.

The MV's provide more light for less wattage, but since they take 22 minutes to warm up to full brilliance, only half as many MV's as incandescents are used in the pattern. This assures quicker lighting results and also a reasonable reserve factor if the MV circuit or any of the lamps should fail. There are 16 500-watt incandescents and eight 400-watt MV's, or a total of 11,200 watts in the pattern, controlled by relay switches.

These units are all in bell-shaped, mirrored glass reflectors, as are also the four pairs of standard "twin" MV and incandescent units of the same wattage, which are

(*Please turn to page* 71)

Banks of incandescent lights, flexibly mounted on lengths of National 1700 surface duct are hung above each aisle in the stockroom.

Simplified and economical lighting units were used in the installation wherever only minor general lighting was needed.

Hinged "docks," which are swung into place beside plane, can supply both sides of the plane with 200-amp. service.

Contractors will benefit from

◆ MORE THAN 60 contractors in our territory have registered as participants in our planned lighting campaign which started Nov. 2 and continues until April 30, designed to sell wiring jobs, spare wiring circuits, fixtures, lamps, tubes and to build repeat business for the electrical contractor.

The plan of the campaign, which includes a contest, was presented at dinner meetings held in each of our seven districts—Newton, Eldorado, Wichita, Fort Scott, Pittsburg, Independence and Arkansas City—where there are 13,827 potential commercial customers owning stores, shops, offices, service stations, drive-ins and restaurants.

The contest part of the campaign consists of crediting each contractor who enters with points for watts of lighting installed, shielded fixtures hung, continuous runs and spare wiring circuits installed when re-wiring.

Contractors were divided into four groups based on the average number of employees used during the past six months and one contractor from each group may win an expense-paid trip to the University of Light, Nela Park, Cleveland.

There will be nine mailings of promotional material by our company and each commercial representative will be held responsible for sending this out on scheduled dates. A selected list of mailing prospects for each representative includes 55 retail stores, 25 food markets, 25 offices and 25 service stations. Each piece includes a self-addressed postage-paid card requesting the booklet "The More They See the More They Buy" which is then delivered personally by our representative.

The representatives will be active throughout the campaign in the contractor's behalf with calls on prospects to sell relighting, permission to make layouts and to get an installation bid from the contractor of the customer's choice.

Contractors will be kept informed of the progress of the campaign and contest with contest standings being sent out periodically along

This direct mail advertising is scheduled for mailing at two-week intervals during a five-month period of the Kansas utility's planned lighting campaign. Supplementary pieces will be distributed by representatives.

utility's planned lighting campaign

by Roy K. Bear
Commercial Sales Manager
Kansas Gas and Electric Co.
Wichita, Kansas

with a copy of each piece of advertising that has been sent to prospects.

We are using all means to keep up interest and activity because there is a relatively long interval in the time it takes to organize a prospect, present and sell a plan and then complete the installation.

The company will mail out 6,400 pieces of promotional literature and give engineering assistance when required. Contractors will be invited to assist representatives in making layouts which will aid some in improving their knowledge of this detail and make them more aware of the possibilities of expansion.

A prepaid reply card will be included with each mailing piece, inviting the contractors' customers to request a free booklet on Planned Lighting for his business. A KGandE representative will personally deliver each booklet. Over 2,000 contractors are already receiving "Today's Business," a national publication devoted to modernization in industry and featuring lighting.

The slogan "advertising opens the door" was featured in Mr. Bear's presentation of the promotion material for the lighting campaign.

Roy Bear previewed sales aids at contractor-dealer dinner meetings before the campaign was officially opened.

Stocking material for small wiring jobs can be a "nuisance" or a profitable business depending on the way it is handled

Try displaying small wiring items

◆ DESPITE THE FACT that most home wiring requires the services of an experienced electrician, there are many simple installations which the homeowner can do for himself, especially in the rural and farm areas, and he naturally considers an electrical contractor's store the logical place to seek such items as he may need for the job at hand. For this reason, the enterprising electrical contractor can turn these numerous calls for "a new light switch," or a "conduit fitting," or "a fuse box," or "a piece of cable," into profitable sales rather than time-consuming nuisances.

One St. Louis, Mo., large contractor-dealer, the Hampton Electric Co., for the past 8 years has attracted a steady flow of these "homeowner mechanics," according to A. J. Vedder, partner in the firm. Because the Hampton company maintains a complete contracting service, in addition to appliance sales, and the store seemed "the natural place to look for such things," often an appliance salesman busy with a $650 freezer prospect was interupted to sell a 25 cent switch plate or a handful of fuses.

When the number of such "nuisance calls" hit 20 per day, Mr. Vedder decided to "do something about it." He already had on hand most of the stock which these customers were calling for, so that creating a "Home Service Department" was primarily a matter of space and personnel.

After some deliberation, the St. Louis appliance dealer hit upon the center rear wall of the store, a space formerly devoted to home-freezers, as the ideal location for the Homeowner Service Department. He installed in this area a modernistic overhanging oak counter, 25 feet long, and behind it a towering wallcase, extending up to a point 8 feet above the floor, composed of 500 oak-faced, pull-out drawers. Attached to the front of each drawer is a sample of the electrical "gadget" or part which it contains, with a total of some 435 items involved. Whether it is conduit, cable, a switch, circuit breaker, or any such item, the customer can quickly find it for himself, if the salesman on duty is busy with another sale. "Actually, that's the reason for the rather heavy investment we put into the cabinet work," Mr. Vedder smiled. "We found through practical experience that most homeowners do not know the actual name of the item they want, but aren't hesitant

(*Please turn to page* 70)

Industrial application

Electric robot operates lumber mill

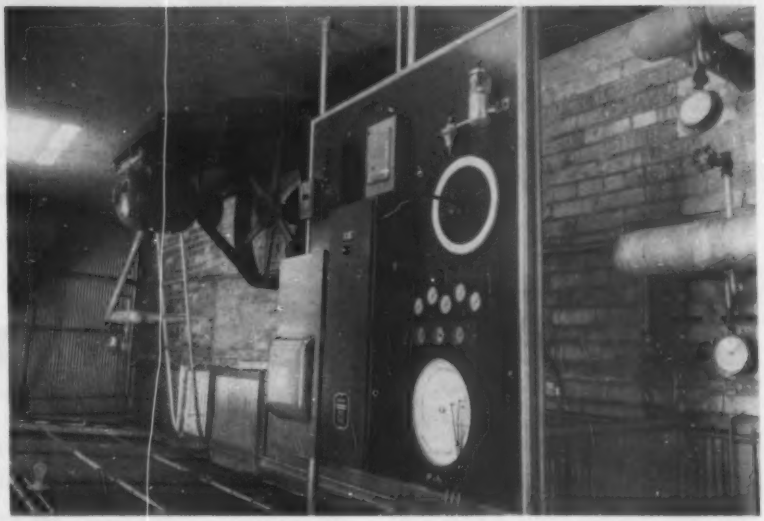
◆ THE OWNER of Winston Lumber Co., in Double Springs, Ala., William S. Coats, has evidence to prove that there is widespread interest in the up-to-date and practical use of electricity by lumber mills. He has had visitors from a number of states who have come just to see and study the ingenious applications he has worked out and put to use at his mill.

Four things characterize the electrical installations by Bill Coats: (1) the thoroughness with which each job is done in the practical wiring and installations, (2) the labor saving features, (3) emphasis on safety, (4) new applications through devices that Bill Coats designed and built himself. Young engineers have visited the plant for ideas. Recently one remarked after a tour and study of the plant: "I'm a graduate of a fine engineering school, but here you have things we were never even told about." Bill Coats is an electrical engineering graduate with several years experience with Alabama By-Products Corporation before establishing his lumber business in 1941. This experience plus an inventive turn of mind that is always seeking a solution to a problem probably accounts for the lumber plant installations that are ahead of anything in the field. Their possible application to other industries is obvious.

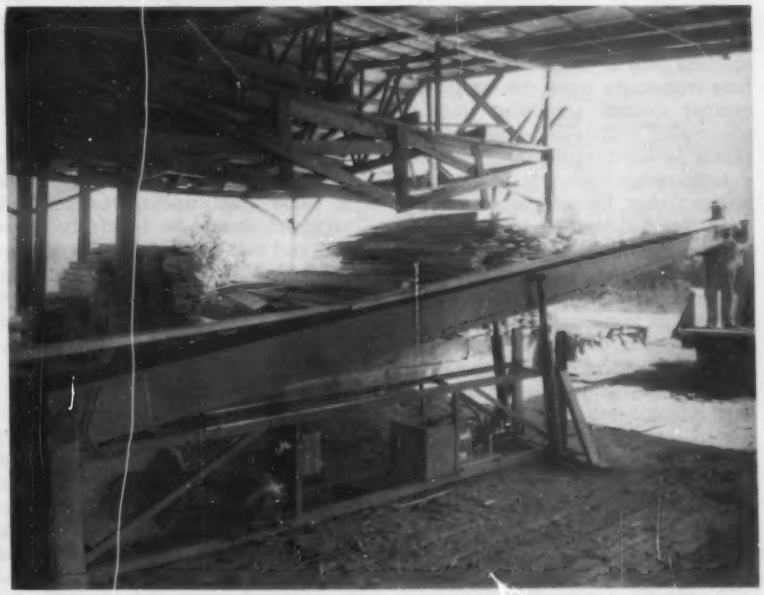
All operations controlled

One of the things that interests visitors to Winston Lumber Company is the boiler room where a switchboard, and its connections forms an electrical robot to operate the system automatically. Electricity does the entire job from pumping water out of a deep well some 650 feet away to returning to the boiler all condensation from the dry kiln. A solenoid automatically provides make-up water and when the steam pressure drops to 100 pounds it turns on the switch that cuts in the fuel system and when pressure reaches

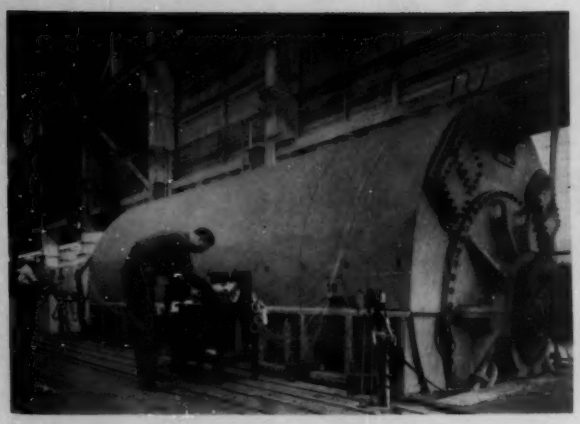
(*Please turn to page* 69)



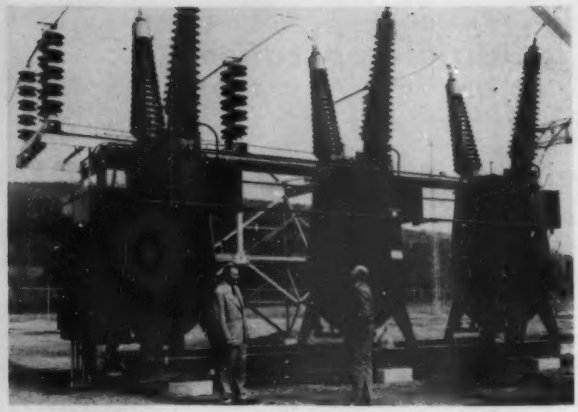
Bill Coats designed and built this switchboard which is the "brains" of the robot system operating automatically the boiler house of his lumber mill. Hand operation controls are in lower righthand corner, and are marked for water pump, water feed system and fuel feed system.



Two motors are used for the 22-foot conveyor belt unit which is used as a take-off and loading device for the planer. One 2-hp motor runs the Speed Selector, and the other 1-hp motor operates the hydraulic lift. A push button on the end by the take-off man controls the delivery to any desired height.



Final tests are made on a 3600-rpm turbine generator at the East Pittsburgh plant of the Westinghouse Electric Corp.



This is the second watchcase circuit breaker installation; 230 kva, 5,000,000 kva with an AA 10 pneumatic operating mechanism.

Long-range system planning

by A. A. Johnson

Manager, Switchgear Engineering
Westinghouse Electric Corporation
East Pittsburgh, Pa.

◆ THE SCOPE of system planning has been defined many times, but it might be well to point out again that in addition to technical problems, it involves many non-technical problems such as the management of men, ideas, materials, time, money, and many related items. The ultimate objective, of course, is to economically supply electric power to present and future customers upon demand. Successful system planning, just as successful business planning, depends on evaluating the future on a long-range basis. It is also important that these plans be made with the full knowledge that they will be regularly revised, with each revision embracing the past and considering new circumstances and conditions apparent for the future. The difficulty of predicting the future must not be used as an excuse to ignore planning.

Your plans important to others

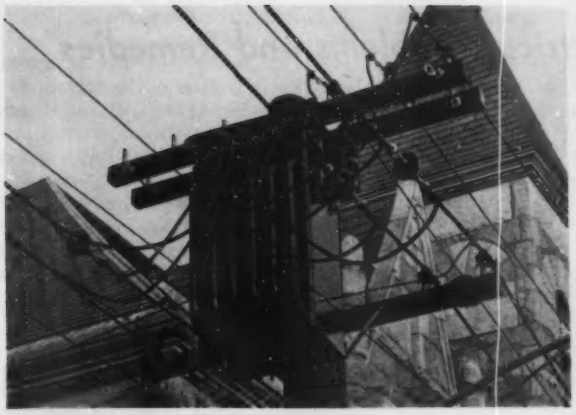
Your plans are important not only for your own use, but also for the manufacturers and suppliers of electrical equipment, mechanical equipment, appliances, and all business activity using electric power. In fact, the entire economy of the country depends to a large extent upon electricity, and the psychological effect of your future planning has a very definite effect on the economic status of all. Your successful planning for the future and the optimism you display can have a beneficial effect on all business.

Sell your plans

One of your most important responsibilities is to sell your plans to your own management. Your program should be carefully planned and related to future predictable economic conditions and the load you expect to supply. Every possible factor should be evaluated and the results presented in a way that will indicate your understanding and appreciation not only of the problem of supplying electric power, but of the economic factors influencing such plans. You should explain that the plan requiring the least expense at present may not be the best plan for the future success of your company. Most of you have seen temporary installations become more or less permanent fixtures.

A second part of the selling job is with your own employees. They should be sold on the objectives of your company and of your plans for the future. They should be given the opportunity to exchange ideas with those outside your company. They should be encouraged to explore new ideas and new techniques applicable not only to the technical part of your business but also to its economic aspects.

The third human element that requires a selling effort on your part is the public. They expect good service, and they have received and are receiving good service. This, of course, must be continued, but they should also be told in general terms about your long-range plans for supplying electric power in your area for residential as well as industrial and commercial development. The appearance of your equipment should be a matter of continuous concern in proving to your customers that you will do everything economically possible to provide equipment and lines in keeping with the area served. You must continue to work with the manufacturers of equipment toward improving its acceptability from an appearance as well as a noise standpoint. You can present your plans to the public in



A CSPB distribution transformer. Rapidly increasing distribution loads indicate need of special attention to distribution design.

A digital computer, such as installed in the Westinghouse Computer Laboratories, can play an important part in system planning.

such a way that they will be very acceptable, and will give a better appreciation and a better understanding of your problem and your interests in their welfare.

Magnitude of planning program

Data from the records of the Edison Electric Institute indicates that on the long-range basis the average construction expenditures in electric utility systems require about 50 per cent of the money for distribution. Between 35 and 40 per cent, on the average, has been for generation, and the remainder for transmission facilities. This points up the problem of planning distribution systems as one of the greatest magnitude, and also the one most difficult to predetermine. Your generating plants, while extremely important, are more or less self-contained. The transmission system, while requiring the smallest per cent of total investment, nevertheless probably requires the greatest amount of time as far as planning future systems is concerned.

General system conditions

It is safe to say that the technical problems of equipment and systems are very well understood by you and your men concerned with system planning. The intangibles are the difficult things to determine. There are, however, certain things that are definitely known and that form a starting point. They include existing loads, existing transmission and distribution facilities, the amount and location of generating capacity, ties to neighboring systems, and the voltages of transmission lines. You also know that more generating capacity and extensions must be made to your system in order to supply expected new loads.

The locations of new generating stations are also usually known, at least well enough to make future system expansion plans. In the case of a steam generating plant, the location is dictated by the availability of water (the possibility of cooling towers), fuel availability, and proximity to the load. All of these factors are usually considered well in advance simply on the basis of securing new locations that meet the above requirements. Knowing the location of the new generating plant, the system planning engineer can determine the need for new high-voltage transmission facilities whether they be overhead or underground. Likewise, these transmission facilities, if overhead, are also dictated to a considerable degree by the possible rights-of-way that can be obtained.

Transmission requirements

Transmission requirements obviously differ with systems. The system planning engineer in the future, however, must look very carefully at the needs for electric power in congested areas, with particular reference to how they will be supplied in large blocks. This may require the use of a generating site remote from the load center, necessitating the use of very reliable transmission circuits. Underground high-voltage cables will probably be required in many new areas of the country just as they already have been required in many metropolitan systems.

As mentioned above, rights-of-way for transmission circuits are very vital to the expansion of power systems. They are becoming more difficult to obtain, and the planning engineer should take a long look ahead at requirements and obtain rights-of-way at an early date. Another possibility to be considered is increasing the voltage on existing rights-of-way either by the construction of new

(*Please turn to page* 65)

Important points to be considered in long-range system planning:

1. Make your plans, recognizing all technical and economic factors possible.
2. Keep the plan up to date by periodic revision as changes are indicated.
3. Work toward the desired plan with every system change. In time you will approach what you consider the ideal plan for your system.
4. Sell your management.
5. Sell your employees.
6. Sell the public.
7. Have the courage of your convictions.

Conference papers discuss "Electrical Problems and Remedies"

Carolina plant engineers confer

◆ SOME 250 plant engineers and maintenance men from textile mills in the Piedmont-Carolinas gathered in Raleigh, N. C., recently for a Conference on Electrical Equipment. The Conference was jointly sponsored by the Textile Sub-Committee and North Carolina Section of the American Institute of Electrical Engineers, and the Schools of Engineering and Textiles of North Carolina State College.

The panel discussion of "Electrical Problems and Remedies" was one of the highlights of this meeting. The panel was composed of W. W. Hanks, Southern Electric Service Co., Charlotte, N. C.; M. R. Brice, Cutler-Hammer, Inc., Milwaukee, Wis.; J. C. LeBens, Bussman Mfg. Co., St. Louis, Mo.; C. C. Gould, Square D Co., Milwaukee, Wis.; G. A. Bumann, Century Electric Co., St. Louis, Mo.; and W. H. Formhals, Westinghouse Electric Corp., Buffalo, N. Y.

J. D. McConnell, Cone Mills Corp., Greensboro, N. C., served as the panel moderator.

About 250 plant engineers and maintenance men from textile mills in the Piedmont-Carolinas gathered in Raleigh, N. C., October 29 and 30 for a Conference on Electrical Equipment. The conference was jointly sponsored by the Textile Sub-Committee and North Carolina Section of the AIEI, and the Schools of Engineering and Textiles of North Carolina State College.

Motor lubrication

The principal topic discussed by the panel was the lubrication of small motors. A representative of a large manufacturer of synthetic fibers stressed that, in his experience, a regular schedule for oiling motors is essential, despite the fact that an experienced oiler is more valuable than any schedule. The schedule must be flexible, and revised as experience dictates.

At this plant, a regular oiling crew has done all oiling of motors during the past four years, except for those in the power house, which are oiled by electricians.

One panel member was of the opinion that oiling schedules for motors are given too much emphasis. Bearing failures traceable to lubrication faults are rare; most occur through other causes. There are more failures from over-greasing, rather than under-greasing. He cited a recent case of a spinning frame motor which ran for about 15 years with no lubrication at all.

The same panel member commented on the growing use of permanently sealed bearings in small motors, both here and abroad. One European company (Siemens-Schuckert) permanently packs all motors up to 50 hp; no provision is made for oiling.

Control enclosures

The development and standardization of industrial control equipment enclosures suitable for textile mills was reported on by Swaffield O. Cowan, Factory Insurance Association. The problem has been under study by a joint committee of the A.I.E.E. and the National Electrical Manufacturers Association since early in 1952.

The committee recommends that control enclosures meet the following requirements:

1. Prevent entry of lint and escape of sparks.
2. Have no unused openings.
3. Have no conduit knockouts or conduit openings. Suggested conduit entry locations to be suitably indicated on the enclosure.
4. Provide sufficient room on each side of the mechanism to accommodate wires sized for maximum current rating.
5. Cover latching device to be positive and reliable.

Enclosures meeting these requirements are already available, designed to operate in an atmosphere of explosive dust; but the flash fire hazards in a textile mill, although serious, do not justify their weight, bulk, and high cost.

The industry is rapidly aban-

doning the use of the N.E.M.A. Type I general purpose enclosure, which is not dust-proof, in favor of a modification with a cover gasket. While this enclosure is not entirely satisfactory, it is a big forward step.

Although there is no control enclosure available which meets the committee's specifications, at a reasonable cost, continuing work is expected to have early results.

Ungrounded power sytems

The ungrounded-neutral system for distribution of power in textile mills (majority use a distribution system of 400 volts or less), has been universally used for years, H. C. Swannell of the J. E. Sirrine Co., told the group.

The following paragraphs are an abstract of other comments made by Mr. Swannell:

Although the possibility of ground faults has increased greatly, it appears that actually ground

Dan McConnell, Cone Mills Corp., Greensboro, N. C. illustrates a point during the panel discussion.

faults do not occur too frequently. This is confirmed by a survey of three large plants, where 25,000 or more motors, as many control devices, and miles of low-voltage circuits are in use. In only one case are ground faults as frequent as once a day; the other two mill groups report one or two a week.

The most important single factor contributing to ground faults is building and machine vibration. For these plants, grounding the neutral of the power distribution system would not alter the conditions that produce ground faults.

When a ground fault occurs with a grounded-neutral system, production must be interrupted until repairs are made. With an ungrounded system production can be continued while the fault is found and repaired during a normal shut down period.

Reduction in size of standard motors was explained by W. H. Formhals, Westinghouse Electric Corp.

One of the principal reasons cited for grounding the neutral of low-voltage systems is to reduce transient over-voltages induced by intermittent ground faults. However, on 600 volt systems the transient over-voltage due to ground faults does not exceed the motor test voltage, and for 480 and 250 volt systems is less than the test voltage.

The only practical method of providing a grounded-neutral system for a majority of mills is to use a grounding transformer, which, apart from increased cost, has limitations which may prevent any substantial reduction of ground faults.

In summary, textile mill experience over many years of operation with ungrounded - neutral systems has been generally satisfactory. At best, any gain achieved through changing to a grounded - neutral system would be limited, and would usually involve considerable expense.

H. B. Greear, General Electric Co., told the conference audience that the practice of grounding the neutral of transmission and distribution systems has been followed for years by the electric utility companies, and during the past 10 years has been adopted by many industrial plants.

An abstract of further comments by Mr. Greear follows:

Grounding the neutral of distribution circuits at 600 volts or less was not initiated on any scale until it was introduced in new plants built during World War II. Since few of these were textile mills, grounded - neutral operation on low-voltage systems has been mainly in other types of plants.

Grounded power sytems

One of the principal reasons for using the grounded-neutral system is to reduce the number of failures from over-voltages in motors and other equipment. These overvoltages result from lightning, intermittent grounds on ungrounded-neutral systems, or from resonance effects.

All ungrounded - neutral power distribution systems, such as those in a textile mill, may be thought of as capacitors, hence, when a ground occurs, repetitive restrikes of the arc across the point of ground permit voltages of five or six times normal to build up. Although these voltages may not be more than the *one minute* high potential tests on new equipment, moisture and other factors reduce the actual amount of overvoltage the equipment will withstand after it is in service for some time.

With a grounded-neutral system, there is no tendency to restrike the arc at the point of ground, since the power current does not lead its voltage in the same manner as the capacitor current. Therefore, overvoltages are not obtained, or are so small that they are not objectionable.

Where purchased power is involved, the majority of the main power transformers are of considerable size and are delta-connected on the 600 volt side. In these cases the cost of securing the grounded - neutral system is the price of a grounding transformer, plus the cost of equipping feeder breakers with a third trip coil, if they do not already have three coils.

On new unit substations the transformers can be secured with the secondary wye connected at little or no extra cost; therefore for new installations the extra cost of securing the grounded-neutral

(*Please turn to page* 67)

The electric power industry in 1953

Construction expenditures set a new record; sales doubled over 1946; expenses continued to mount

by Walter H. Sammis
President
Edison Electric Institute

◆ THE EXTRAORDINARY postwar growth and service record of the electric industry was continued in 1953 with noteworthy gains over the preceding year.

Particularly outstanding was the high level of electricity output and revenue recorded for the year. Construction expenditures of the investor-owned companies set a new record. Likewise, financing by the companies for the building program made an all-time record, with the sales of common stock the greatest of any year. New power generating installations by the electric industry in 1953 were also the greatest for any year.

Perhaps the most important problem that confronts the investor-owned electric utility industry today is the inroad that government proprietary operations are making in our business. Government proprietary business is a threat to all private enterprise. When government goes into proprietary business it pays no Federal taxes and makes little, if any, payments in lieu of state or local taxes, and in most cases no interest on the capital employed is charged against the government proprietary operation.

If the government with the tax monies of the citizens is going to compete with them in business, government proprietary business should be operated on an equal basis with private proprietary business, charging to government business the true costs of doing business. Government should not base its business prices on subsidized costs at the expense of the customers of private business and the general taxpayer.

Total generation of electricity in the U. S. passed the half-trillion kwhr mark in 1953. Production by the entire electric industry (companies, co-operatives and governmental agencies) reached 442 billion kwhr, an increase of 43 billion over the preceding year. Production by industrial and railway plants was 71 billion kwhr, bringing the grand total to 513 billion.

New customers

One million four hundred thousand new customers were added by all components of the electric industry in 1953 bringing the total to 49,900,000 taking service at the end of the year. Nearly sixteen million new customers have been added by the industry in the past eight years. Since electricity is now in reach of nearly every American home, with about 98 per cent of occupied homes, both urban and rural, enjoying electric service, the growth in customers during the year was due largely to construction of new homes to take care of population increase.

Greatest domestic consumption

The continually expanding use of electricity in the home was emphasized by the greatest increase on record in the average annual use by the householder. The increase was 186 kwhr during the year, and the total average consumption for 1953 was 2355 kilowatthours, an amount more than double the average use nine years ago.

In addition to lighting, more than half of American households now use nine electrical appliances — radios, irons, refrigerators, clocks, washers, toasters, vacuum cleaners, coffee makers and television. Phenomenal increases have also been made since the war in the use of such heavy duty appliances as ranges, water heaters, freezers and dryers.

Despite continuing inflationary factors the average revenue per kwhr sold to domestic customers held its own, dropping from 2.77 cents in 1952 to 2.75 cents in 1953, indicating the possibility of a leveling off of the industry's historic downward price curve for electricity for residential use.

Starting at 24 cents per kwhr in 1882, the average price to domestic customers was 10.5 cents in 1907, 25 years later, down to 5.6 cents in 1932 and to 4 cents in 1939. Earlier declines resulted largely from technical advances in electricity supply, and in more recent years from further refinements in equipment and operational improvements, increases in efficiency of new plants, and the constantly expanding average consumption of electricity by the domestic consumer.

Postwar inflation, in many cases doubling the cost of elements entering into the production of electricity (labor, construction materials, generating and distribution facilities, fuels, etc.), have progressively offset the conditions that made electricity's unique price history possible.

Rate increases

Regulatory commissions are continuing to recognize the inroads of inflation, as evidenced by the granting of rate adjustments required to insure the financial strength necessary for the continuance of adequate electric service to the nation.

Four hundred applications for rate increases were made by the electric companies from 1946 through the first 11 months of 1953, according to tabulations of the Edison Electric Institute. Of this number, 351 applications were granted, 28 are pending action, 11 were withdrawn and ten denied.

The 1953 record alone shows 56

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LEV-O-LETS speed surface installation *because* their narrow, 1¾" width allows for secure mounting on studs and joists only 2" wide or narrower . . . *because* they provide large terminals that make loop or clamp connections faster . . . *because* they provide bus bars for three-wire or thru-feed connections . . . *because* they can be used wherever non-metallic sheathed cable can be used. LEV-O-LETS are safe too—high barriers between terminals add extra insulation to the already low arcing characteristics of the sturdy, brown urea plastic used in their heavy duty construction. LEV-O-LETS meet R.E.A. and Federal specifications. Listed by U.L. and C.S.A.

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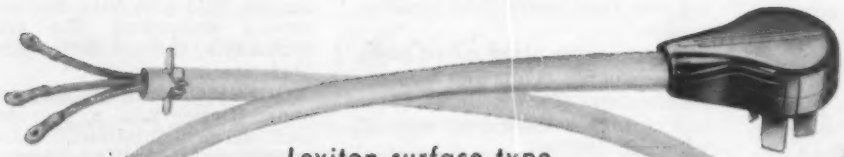

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Receptacle is made of heavy duty bakelite, with self-positioning cover secured with a single screw. 5/16" diameter terminal screws with swivel washer cups assure fast, positive wiring. Cord sets in 3 foot or 5 foot lengths with *rubber molded-on cap* or *bakelite cap*. Listed by U.L. and C.S.A.

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actions by the Commissions. Applications granted were 35, pending are 15, and six were withdrawn or denied.

By the end of 1953, an estimated 5,010,000 farms had electric service, 93 per cent of the overall farm figure. All but 2 per cent of the nation's occupied farms now either have electric service or have it readily available. Until recently, the primary concern in farm electrification was the extension of power lines to the farmer. Now, however, with nearly every farm having electricity at hand, the emphasis has shifted to the study and development of techniques and equipment to enable the farmer to make increasingly profitable use of his electric service.

Sales double 1946 sales

Electricity sales by the electric industry in 1953 totaled 382 billion kwhr, an increase of 39 billion over 1952, or 11.5 per cent. The kilowatthour increase in sales was greater than in any preceding year. Sales were double that of 1946, the first year after the end of World War II. Sales to industrial customers totaled 189.5 billion kwhr, a 13.2 per cent increase over 1952, residential sales were 96.8 billion kwhr, an 11.5 per cent increase and to commercial customers, 68.2 billion kwhr, a 9.9 per cent increase. Sales to other customer categories totaled 27.5 billion kwhr.

With the relaxation of material controls in late Spring, the industry's postwar construction program got under full headway, making possible a record installation of 9,200,000 kw of generating capability during the year. Of this total 6,900,000 kw was installed by the investor-owned companies and the remainder by cooperatives and governmental agencies. These installations brought the total installed generating capability of the industry at the end of 1953 to approximately 93,500,000 kw, or about double that of 1952.

For the country as a whole the gross margin between generating capability and peak power demand in 1953 was 13,500,000 kw or 17 per cent, as compared with 8,850,000 kw or 12 per cent in 1952. Growth in December peak demand was 6 per cent, as compared with 7 per cent in 1952 and 9 per cent in 1951.

An adequate supply of power was maintained in all sections of the country, including the Pacific Northwest and the Tennessee Valley area, sections where drought conditions during the past few years had resulted in some curtailment.

Construction scheduled for 1954

Total scheduled construction for the entire electric industry in 1954 is 14,100,000 kw of generating capability, of which, 9,431,000 kw is planned by the investor-owned companies. The addition of this amount to present capability will bring total installations to 107,600,000 kw of generating capability, of which approximately one-half will have been added since 1947.

Expenditures during 1953 for construction by the investor-owned companies totaled $2,850,000,000 as compared with $2,599,000,000 in 1952. The 1954 construction budget is $3 billion.

Construction expenditures of the electric companies from the end of World War II to the end of 1953 totaled $16 billion.

Money obtained to finance the year's construction program of the electric companies totaled $2,850,000,000. Nearly two billion of the 1953 total was obtained from the sales of securities and the remainder, $910,000,000, was drawn from depreciation reserves and surplus accruals. Bond sales in 1953 totaled $1,200,000,000, common stock $525,000,000 and preferred $215,000,000. The total of sales of common stock exceeded that of 1952 by 25 per cent and was only slightly less than the combined sales of common during the four years 1946-1949 inclusive.

Investment in plant and property of the electric companies was approximately $25½ billion at the end of 1953 as compared with 12 billion in 1945.

Gross revenues of the investor-owned electric companies were $5,940,000,000 in 1953, an increase of 9.5 per cent, or slightly more than one-half billion over 1952, and more than double gross revenues in 1944. Net income of the companies was $1,045,000,000, an increase of 9 per cent over 1952. Net income was also double that of 1944.

Expenses continue to mount

For the fourth straight year taxes have been the biggest item of the electric companies' expenses. In 1953 taxes, Federal, state and local, consumed $1,338,000,000 of electric operations revenues, a 9.3 per cent increase over 1952. Federal taxes were $830,000,000 and state and local $508,000,000.

Wages and salaries totaled $1,157,000,000 in 1953, an increase of 6.6 per cent over the preceding year. Fuel, the third highest item, was $1,025,000,000, up 11.5 per cent over 1952.

The relatively high increase in the fuel bill was due to a 13.8 per cent increase in kilowatthours generated by fuel, as compared with a 2.3 increase for hydro, and a 12 cent per ton average increase in the cost of coal.

Increasing efficiency in fuel burning stations brought downward the coal consumption per kwhr generated from an average of 1.097 lbs per kwhr in 1952 to 1.065 lbs in 1953. Ten years earlier the comparative figure was 1.297 lbs per kwhr.

Code section given official interpretation

SECRETARY of the National Fire Protection Association, Electrical Section, Charles L. Smith, has announced the following official interpretation of the National Electrical Code.

Interpretation No. 396
(Issued October 15, 1953)

Article 230: Required Size for grouped Disconnect Means.

STATEMENT: A small two-family building of such size that each apartment can be adequately served by No. 10, 3-conductor feeders, utilizes the provisions of Section 2351-a to have two sets of service equipment. The service conductors comply with Section 2304.

QUESTION: Is it permissible under Section 2357 to provide for each service subdivision, service equipment rated at 50 amperes and then supply 30 ampere plugin circuit breakers or must 50 ampere circuit breakers be used as service disconnects and smaller circuit breakers or fuses placed in series to protect the No. 10 wires?

ANSWER: If the 50 ampere service equipment has provision for only two single pole circuit breakers with handle ties or one double pole circuit breaker, then the circuit breakers must have a minimum rating of 50 amperes. If, however, the service equipment has provision for the installation of a number of circuit breakers, not in excess of six, for the disconnecting means, then the individual ratings of the circuit breakers installed may be less than 50 amperes, provided their aggregate installed capacity is 50 amperes or more.

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FA NQP Quicklag P panelboards are available in eleven sizes of enclosures — six with main lug connection and five for main circuit breaker connection, 50 — 225 amp capacity. These, plus a stock of individually packed single and double pole FA QP Quicklag P circuit breakers will fit any job requirement. Because all circuit breakers are interchangeable, it is easy as replacing a light bulb to make changes or add new units.

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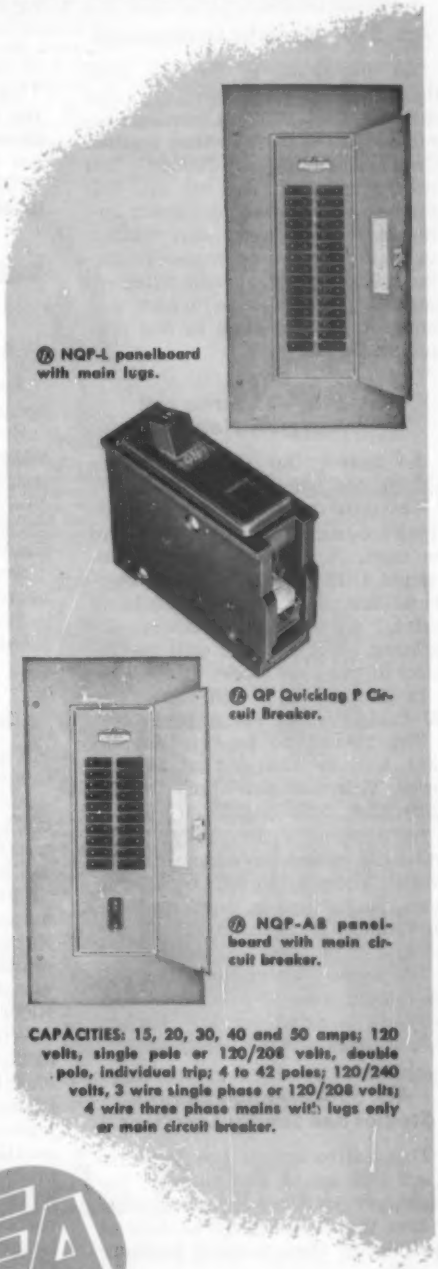

FA NQP-L panelboard with main lugs.

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FA NQP-AB panelboard with main circuit breaker.

CAPACITIES: 15, 20, 30, 40 and 50 amps; 120 volts, single pole or 120/208 volts, double pole, individual trip; 4 to 42 poles; 120/240 volts, 3 wire single phase or 120/208 volts; 4 wire three phase mains with lugs only or main circuit breaker.

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1) Quick-make and quick-break operation manually or automatically on harmless overloads, short circuits or severe overloads. Handle position indicates "tripped."
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The 1953 Electrical Code

A special report

Art. 510—Specific Occupancies

As indicated in Section 5003 these are the amendatory rules covering the specific hazardous occupancies outlined in that section. Each occupancy is defined. The hazardous areas are set up. The wiring in the hazardous areas and beyond these areas are treated separately and are completely outlined. In addition, specific rules are established for items which are more or less peculiar to the particular occupancy.

Art. 520—Theatres and Assembly Halls

As noted, the caption of this Article has been changed.

The code should not decide when or where emergency lighting should be used. It should only be concerned with requiring a safe electrical installation where building codes, etc., specify emergency lighting. Section 5202 will be deleted in the 1953 Code.

In Sections 5211 and 5242 Type MI cable will be recognized.

The 15-ampere load in Section 5241 will be changed to 20 amperes. This will also apply to Sections 5256, 5292 and 5293f.

As previously noted Types SU and SUO cables have been discontinued. These types will be deleted from the listings in Sections 5243, 5256 and 5293h. In 5293h Types SO and ST will be added.

The second sentence of 5261 will be deleted since this will be more properly treated in the revised Section 5263 of the 1953 Code.

Art. 530—Motion Picture Studios and Similar Locations

This entire article has been revised and as in the case of the other new articles represents more or less the bringing up to date of the rules in these various sections.

Art. 600—Signs and Outline Lighting

Type MI cable is recognized in both Sections 6021a and 6021c.

by B. Z. Segall

This is the concluding part of the series of articles outlining the changes in the National Electrical Code brought about by the 1953 revision. The series began in the September 1953 issue.

Art. 610—Cranes and Hoist

Sections 6111e and 6113 will recognize Type MI cable.

Section 6112b will be recaptioned "minimum." Also the paragraph "1" will be revised to permit No. 16 wire if the 15 minute motor current does not exceed the value shown in the table in 6112a.

Section 6113a and 6113b have been revised for clarity.

Section 6121e4 has been revised to conform to present day practice.

Art. 620—Elevators, Dumbwaiters and Escalators

The 1953 Code will present practically a complete revision of this Article. Although every section has not been revised the revisions are so extensive as to practically make the entire article a new one.

(The following correction is to be made in the first edition of the 1953 National Electrical Code. This correction has been issued by the secretary of the Electrical Section, NFPA.

Wireways in Hoistways. Section 6206, covering wiring methods for elevators, dumbwaiters and escalators specifically permits metal wireways in elevator shafts and escalator wellways. Section 3622 prohibits wireways in hoistways, which was an editorial error in correlation. The Electrical Correlating Committee now advises that the intent is to permit this wiring method in hoistways. Section 3622 should accordingly be corrected by deletion of item 2, "in hoistways." This change is to be made in future printings of the 1953 Code.)

Art. 640—Sound Recording and Similar Equipment

Reference to Types SO and SUO wires will be deleted from Section 6405d and Types ST, SJO and SJT will be added.

Art. 660—X-Ray Equipment

A new Section 6607 will limit the number of control circuit conductors in a raceway to the number shown in Table 9 of Chapter 10.

An editorial revision in Section 6611 will correct the term "current-breaker" to "circuit-breaker."

Art. 665—Induction and Dieltric Heat Generating Equipment

In the case of this type of equipment being used by a surgeon for electro-surgical purposes it is in the hands of an expert. For this reason, it is felt that the surgeon while he is operating should not be hampered with a shield over the foot switch button and Section 6664 will be revised to indicate this exception.

Art. 700—Emergency Systems

This article has been completely revised. It will be applicable to all "emergency systems" rather than to only lighting systems as in the 1951 Code. Thus power systems, etc., which will be necessary for emergency service will be covered.

Art. 710—Circuits and Equipment Operating at More than 600 Volts Between Conductors

This entire article has been completely revised to reflect the present state of developments.

Art. 725—Remote Control, Low Energy Power, Low Voltage Power and Signal Circuits

The heading has been revised to include "low voltage power circuits."

In Section 7251 there will be in-

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Duplex flush receptacle. Wide ears, parallel slots. Box screws mounted in ears make installation cheaper. Double wiping contacts. Meets all government specifications. 10A.-250V., 15A.-125V.

3201
Heavy duty single pole T Rated switch and double contact receptacle. Dustproof bakelite housing. Brown or ivory. Meets all government specifications. Switch: 5A.-250V., 10A.-125V. T Receptacle: 10A.-250V., 15A.-125V.

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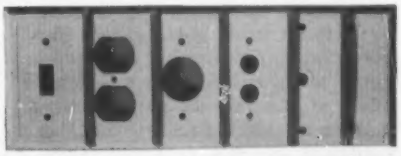

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serted the phrase "low voltage power circuits."

These low voltage power circuits operate electrically driven valves and similar apparatus. The valves usually are controlled by 25 volt shaded pole motors and draw up to 70 va of power.

A new Section 7255 will define these circuits. The voltage will be limited to a maximum of 30 volts and the power to 1000 VA. The circuits will be treated as Class I remote control circuits.

Section 7264 will be revised to show a type RF-2 conductor instead of a type RF-32.

Section 7267 will recognize Type MI conductors.

A new Section 7275 will cover "overcurrent protection" for the Low voltage power circuits. A new Section 7276 will specify the requirements for the "Transformer Rating" for these circuits.

Section 7292b has been revised to recognize coverings other than braids and to stress the need for non-combustible coverings.

Art. 730—Outside Wiring

Section 7301 has an editorial change to clarify the intent of this section. The phrase "and outline lighting" will be substituted for "Other extensions of interior wiring."

Section 7313 will recognize the use of Type MI Cable.

Art. 800—Communication Circuits

Open conductors of a communication circuit exposed to accidental contact with light and power conductors operating at more than 300 volts can be fastened to the woodwork on a building or may enter a building without the use of supplementary insulators if a protector without fuses is installed. The insulators are required if a protector with fuses is installed. A study of the recorded experience of these installations show that the insulators are not required when suitably insulated conductors are used to extend the circuits to a building from a cable having a grounded metal sheath.

The last sentence of 8021c3 and the first sentence of 8021c4 have been revised to permit this type of construction.

In the dwellings using concrete slab on ground floor construction many of them have the water pipes brought up through the floor slab into an interior wall. The water pipe, therefore, is not available for ground connection without cutting an opening into the wall or running a ground lead to some other remote part of the residence. The light and power circuits are grounded during the construction of the house but the telephone circuit is usually not taken care of at this time.

A new rule will be added to Section 8041b5. This will state in effect that where it is impracticable to connect the protector grounding conductor directly to the water pipe then the connection may be made to the service conduit, service equipment enclosure or the service grounding conductor.

Art. 810—Radio and Television Equipment

The title has been changed to include television equipment.

Some fatalities have been reported where dipole antenna structures have fallen on power circuits. Where such conductors cannot be properly supported the 1953 Code will require in Section 8153 that the grounding conductor be increased in size, proportionately to the unsupported distance.

Where sufficient mechanical protection cannot be given to the grounding conductor it may be necessary to increase the size of the conductor to give it more inherent strength and thus compensate for this lack of protection. Such a rule will be set up in the 1953 Code Section 8154.

Both the above rules will serve, more or less, as "enabling acts" for the Code enforcing authorities to require these larger sized grounding conductors when they deem them to be necessary.

Section 8155 has been revised to require the grounding conductor to be run in as straight a line as "practical" rather than as "possible."

The reference in Section 8156 to Section 2582 would permit television antennaes to be grounded to cast iron vent pipes. These are not suitable for television grounding electrodes, so this Section 8156 will be revised to show first the general preference for a water pipe system electrode, and then the use of the made electrodes described in Section 2583 if such water piping system is not available.

Chap. 9—Construction Specifications

An interim amendment of June 9, 1952 recognized the marking of cartridge fuse barrels by printing directly on the barrel. Section 92403 has been revised to recognize this marking method in addition to the usual method of attaching a printed label.

In Section 93101b the term "fibrous covered" will be deleted before the word "conductors." In effect this will recognize the rubber, neoprene and other types of approved jackets for conductors.

The exception in Section 93101d for identification of single conductors of No. 6 or smaller has been extended to include Type MI cable.

The 1953 Code will show appropriate additions to the Table in Section 93101e to show the major construction features for Types MI, RUH, RH-RW and RHW conductor insulations.

The same table will also show the changes to be made for fixtures to correlate the 1953 Code with the new UL Standards for flexible cords and fixture wires. The table will show the construction features for types RF-1, RF-2, FF-1, FF-2, RFH-1, RFH-2, FFH-1 and FFH-2 fixture wires, only.

The table in Section 93101f will be revised to show that the insulation thickness listed will apply as well to Types TH and RW conductors as well as the Type R conductors which was the only type shown in the 1951 code.

A new Section 93301 will cover additional construction features not covered in Article 330 or in the Table of Section 93101e for Type MI cable.

Sections 93361, 93361a and 93361b will be revised to reflect the new requirements for the Types NM and NMW nonmetallic sheathed cables.

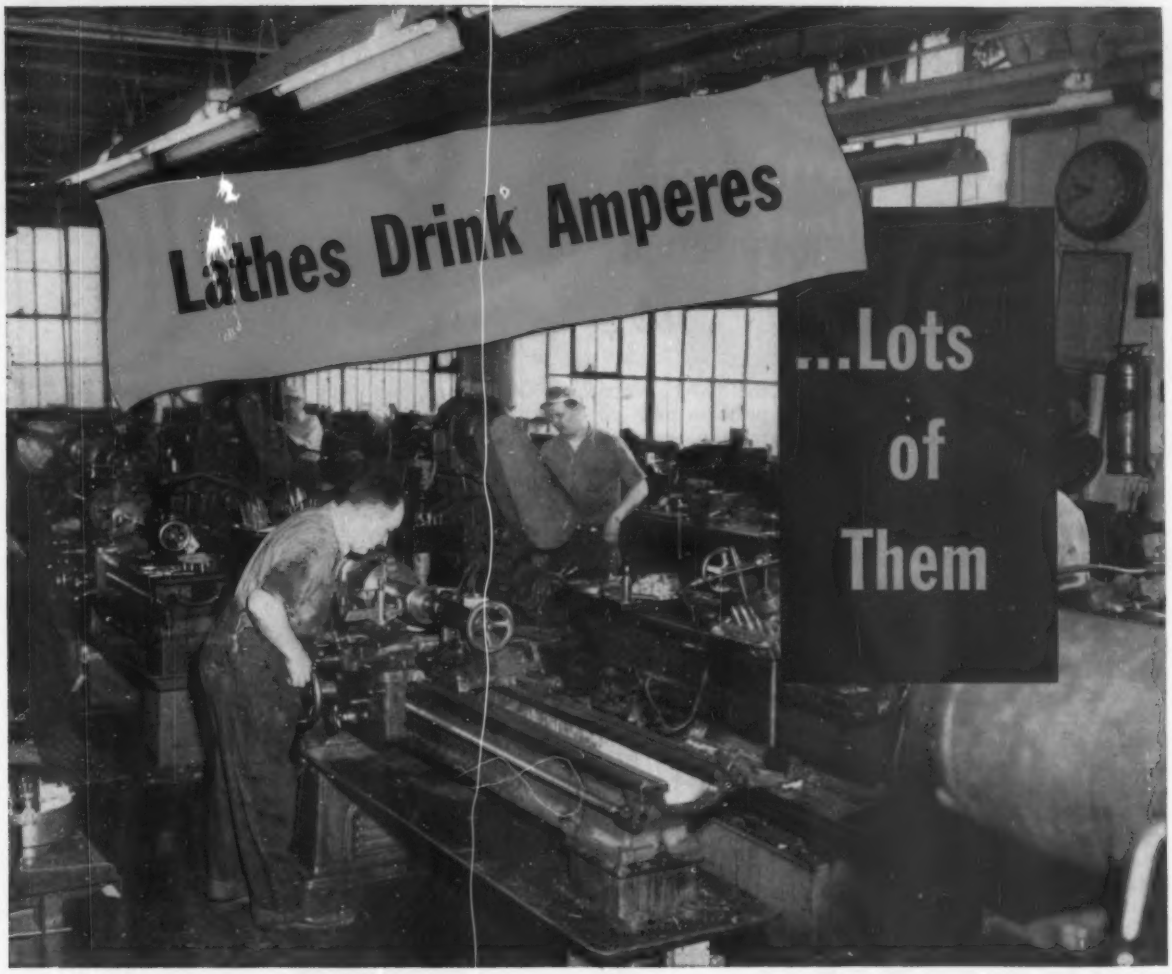
A new section 93391 will cover the new Type UF cables.

The clause at the end of the last sentence of Section 94002b has been replaced by a new paragraph which will permit the use of solid white or natural gray finish on one conductor of a type C, PD and PO flexible cord if there is a colored tracer in the braid of each other conductor of the cord.

The phrase "if provided with insulation" has been deleted from the first sentence of Section 94003. The fine print note in Section 94003b has been deleted to correlate this section with the changes in Sections 2112 and 2557a.

The second sentence of Section 94004 has been deleted. The last sentence has been changed to apply to belt filler in Types P-1, P-2, PW-1, PW-2 and PW cords in

(*Please turn to page* 63)



Lathes, grinders, milling machines, drill presses and other machine shop equipment use plenty of amperes in their operations. If you slow down or stop these operations, you interrupt production; and when you interrupt production, you interrupt profit.

The power supply of these production tools must be constant. If equipment slows down because of poor wire and cable, work in process may be spoiled. If the production equipment stops, then machine time and labor are wasted.

Simplex-ANHYDROPRENE Wires and Cables are ideal for wiring to machine tools. The neoprene jacket is resistant to oil mist and cutting oils. These wires are light in weight and small in diameter. They are fast and easy to install. Their smooth neoprene jacket permits easy pulling through conduit. They do not have fibrous braids to fray or rot.

Whether you are wiring a small laboratory shop, or a large production shop, use Simplex-ANHYDROPRENE Wires and Cables. You can depend on them.

Simplex

WIRES & CABLES

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.

New developments

that help to build business

New outlet design reduces wiring modernization cost

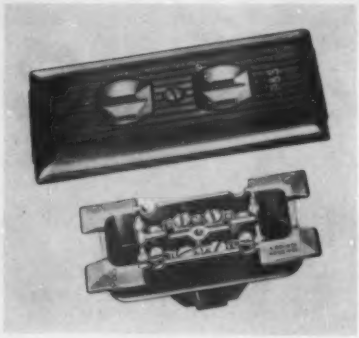
A COMPLETELY NEW type electric outlet has been introduced by the Pass - Seymour Company of Syracuse, N. Y., to simplify the installation of additional plug-in receptacles. The great increase in home appliances has multiplied the number of outlet locations needed for every room in the house. At the same time, recent innovations in wall construction have made the installation of conventional boxes more difficult.

The new P & S "500" U-AD-M duplex outlet is designed on a new principle to permit simple speedy placement of plug-in locations in residential, commercial and institutional buildings. There are no longer any metal boxes to screw into the wall, no holes to punch out, no extra clamps, soldering or taping.

The P & S 500 is listed by insurance underwriters. The entire housing and face plate act as an insulator. By placing the duplex outlets in a number of strategic locations in each room, dangerous and unsightly extensions are eliminated. Furthermore, the new unit cannot rust or corrode.

The simple components of the P & S 500 U-AD-M outlet are completely packed in a single cardboard container, on one side of which are pictured eight easy steps for installing the unit. The other side of the package has a cut-out opening which is placed on the wall or baseboard and traced with a pencil to outline the exact wall opening required. Holes are then drilled at the corners and the opening quickly cut out with a small saw. It is unnecessary to square the drill holes because the outlet has rounded corners to match. The electric cable is then inserted through the back of the outlet and wired to the terminal screws. Two barbed metal straps are placed in top and bottom of the wall opening. The outlet is inserted in the hole where it is held flush by corner flanges, and the two protruding straps are pressed into pockets in the box with a screw driver, securing it firmly to the wall. The face plate is then mounted with a single screw, nesting itself to the outlet in perfect position.

This totally new method of installation eliminates the loose unlevel fit sometimes encountered when metal boxes are used. There



This new convenience outlet is designed for use with non-metallic sheathed cable. No outlet box is required and a special device keeps it tightly in place.

1 Cut cover of box along perforated line and use cover to scribe outline of wall opening.

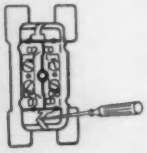
2 Drill holes in two corners. Then cut outline with keyhole saw.

3 Thread cable through knockout holes in back of U-AD-M and then tighten metal clamp against cable.

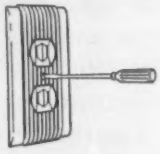
4 Fasten exposed wires under the two terminals.

5 Fasten strap clips to top and bottom edges of opening by placing teeth in back and bending straps outward.

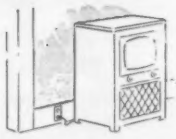
6 Hold clips in place and press outlet body into wall recess.



7 Force extended straps into two end pockets of the plastic body.



8 Assemble wall plate as indicated.



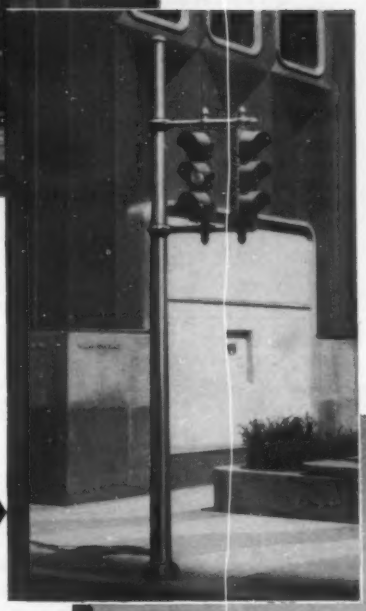
New appliances and TV sets require additional outlets—P&S 500 U-AD-M is the answer.

These diagrams are reproduced from the carton of the convenience outlet that does not require an outlet box. One side of the carton becomes a template for marking the wall cutout. Where inspection authorities permit the use of non-metallic sheath cable circuits, this new box should prove a wonderful timesaver in home wiring modernization.

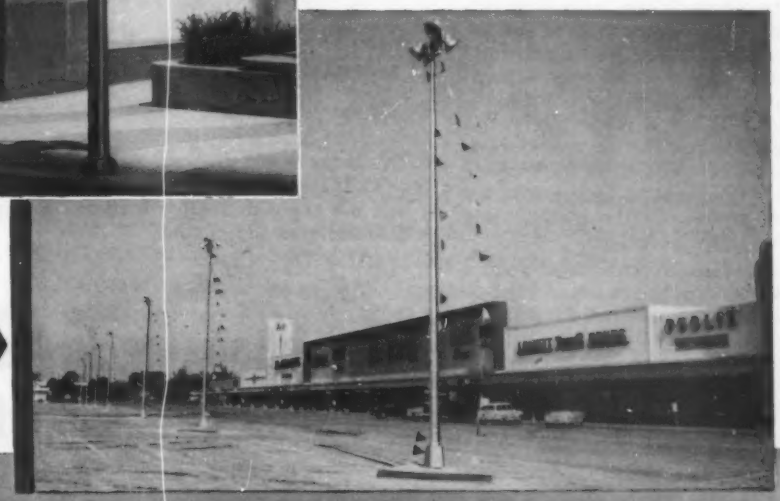
HAPCO Aluminum Alloy Standards

for Street Lights
Traffic Lights
Flood Lights

A New England city chooses this Hapco Standard and Bracket with special features including a festoon outlet used as a plug for a photo-electric cell.



A Hapco Aluminum Alloy Standard with traffic lights harmonizes with the world's first building with all-aluminum exterior walls.



A parade of Hapco Standards with floodlights illuminates a new shopping center in the sub-tropical South.

The urge for civic beauty is dotting the map everywhere with attractive Hapco Aluminum Alloy Standards and Street Lighting Brackets.

Hapco Aluminum Alloy Standards retain their original lustrous beauty, untarnished by atmospheric conditions. Long life with a complete lack of maintenance requirements guarantees a minimum overall cost. Hapco gracefully tapered standards have equal wall thickness and uniform strength throughout. Their high visibility helps to reduce accidents. Their light weight — about one-third that of steel — makes them easy to handle, easy to erect. Available in seamless lengths up to 40 feet – adaptable to any type of internal or external circuits.

HUBBARD ALUMINUM PRODUCTS COMPANY

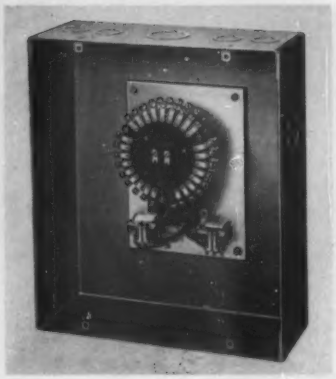
MANUFACTURERS OF HAPCO QUALITY ALUMINUM PRODUCTS

A Division of HUBBARD and COMPANY

6301 Butler Street • Pittsburgh 1, Pa.

is no danger of cracking the face plate when it is screwed on because it is made of heavy reinforced bakelite supported by an interlocking rib. The outlet is locked solidly in the wall regardless of plaster thickness or type of lath behind it. Much of the lath in existing homes is springy, splintery and slotted, making it hard to screw in old-type boxes. Many new types of wall construction of composition board also offer poor support. The 500 unit requires no screws for mounting and adapts itself to all these conditions. Because it is more compact it is able to fit into narrower apertures and shallower walls or baseboards.

The P & S 500 duplex outlet is designed for use with non-metallic sheath cable. It is available in brown or ivory high quality electrical bakelite and has a face plate styled to blend with modern or traditional interiors.



By means of this motor-driven unit a single remote control switch can be made to turn on or off as many as 25 circuits.

Motor-driven remote control extends usefulness of system

A NEW MOTOR-DRIVEN master switch has been added to the General Electric remote-control wiring system, according to an announcement from the company's Wiring Device Department. This new switch, called the Circuit Servant, is a 24-volt, 25-circuit switch, with each of the 25 circuits on the switch capable of operating one remote-control relay (RR-2) which in turn controls one lighting circuit.

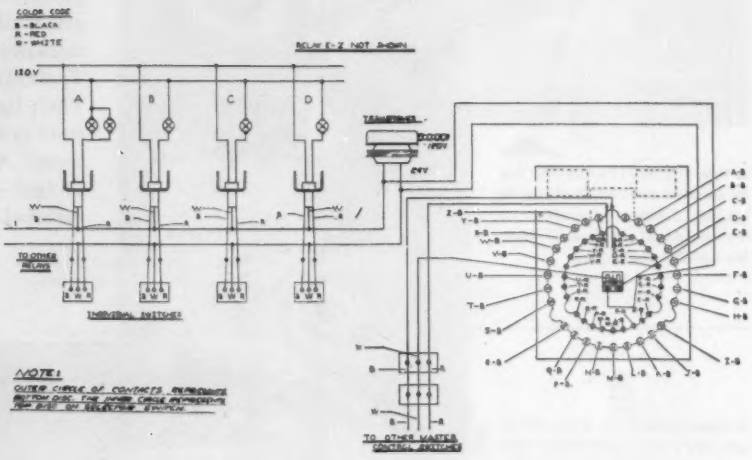
Driving mechanism of the motor-driven switch is energized by standard low-voltage remote-control switches which can be installed to control the motor-driven switch from as many different locations as desired. Pressing the ON or OFF side of the low-voltage switches will cause the motor master to OFF or ON respectively, the 25 lighting circuits connected to it. After either an ON or OFF operation, the motor-driven master switch automatically resets itself for the next operation.

The motor-driven master switch can be used in the home to control a pre-selected pattern of lights inside and outside the house. In factories, offices, and institutions, it can be used to control banks of lights. The motor-driven switch may be installed parallel or cascaded, for example, the 25 circuits on one motor-driven switch may be connected to 25 other motor-driven switches to achieve control of 625 lighting circuits, etc., until all lighting circuits desired are controlled.

Catalog number of the new switch is RMS-3, and it is rated 3 amp, 25 volts.

TYPICAL WIRING DIAGRAM

RMS-3 Circuit Servant



This is the wiring diagram of the new motor-driven remote control switching unit. The units may be cascaded so that each contact of the 25-contact unit will energize another such unit and a single remote control button will thus energize 625 circuits.

Lamp changing in hazardous locations now simplified

BY THE SIMPLE DEVICE of designing one standardized Unilet Body to fit both 60 to 200 W. and 300/500 W. Dome Unit Assemblies, Appleton engineers have licked the time-consuming problem of lamp exchange in hazardous locations.

These explosion-proof fixtures are known as the Appleton Vented "AA-51" Series and are approved for all hazardous areas in Class 1, Groups C and D.

The quick servicing of lighting units in hazardous areas is of vital importance in maintaining today's rigid production schedules. With

Hazacord Portable Cable being used on a set of THE ROBE, a 20th Century-Fox Production in CinemaScope. Color by Technicolor.

HAZACORD STARS ON LOCATION IN HOLLYWOOD...

Here's another instance of Hazacord's ability to meet unusual service conditions. This is a special portable cable of three conductor flat parallel construction ordered for the set of THE ROBE at 20th Century-Fox Studios. Though subjected constantly to the rough treatment of hundreds of cars and trucks running over it, this Hazacord has shown little evidence of wear. That's because it's Hazaprene ZBF-sheathed for maximum toughness as are all Hazacord flexible cords and portable cables.

All Hazacords are so carefully job-engineered that they give the effect of having been built especially for *your* job. That's why it's a good idea to call in your Hazard representative to help select the Hazacord most suitable for your needs.

Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZACORD Mold-Cured portable cables

1868

These photos show the simplicity of changing out lamps in hazardous location with a new uniform Dome Unit Assembly. It takes all size bulbs from 60 to 200 watts and 300/500 watts.

the "AA-51" Series this is easily accomplished in less than one minute with assured safety.

Appleton's exclusive 5 Thread Safety Chamber means that there are always 5 full threads engaged when contact is made or broken. Thus any arcing, due to current being left on during exchange of fixtures, is always confined in approved explosion-proof manner.

Because of the interchangeability of the Dome Unit Assemblies it is possible to set up a "stand-by" system which takes care of lamp replacement and increased wattage needs. This system is based on a ratio of one stand-by unit in stock for every ten units in service. How this system operates is illustrated by the accompanying series of photos.

Photo 1—Proper wattage unit is selected at a glance. Carrying handles attached facilitate quick installation.

Photo 2—Lightweight easy-to-carry unit and a screw driver is all maintenance man needs to service burned out lamp or increase wattage.

Photo 3—Screw driver inserted into notches on standardized Unilet Body uses release lugs for fulcrum. Entire Dome Unit Assembly including lamp unscrews in a jiffy.

Photo 4—Reverse the procedure with a fresh Unit and the job is complete with speed and safety, even if the current is inadvertently left on while change is made!

Photo 5—Maintenance man returns old unit to workbench where re-lamping can be done in safety and spare time. Total elapsed time for exchange only 58 seconds.

General purpose switch for a-c offers many advantages

by Charles H. Hodgkins

ONE OF THE MOST progressive and forward-looking advancements in the electrical field in decades is realized in the development and adoption of a general purpose switch for controlling alternating current circuits exclusively. This is of particular significance and importance to specifiers, installers, and users of switches for the control of branch circuits, lighting, motor loads, and electric appliances. Wide opportunities are also possible for broader applications, longer and better performance, and greater economy. It is a momentous step in the history of the wiring device industry, and is the result of recognition by the trade and the Underwriters' Laboratories of the present preponderant use of alternating current in residential, industrial, and commercial occupancies.

Heretofore a switch for general purpose use had to be suitable for both direct current and alternating current applications. A switch is considered to be a general-use switch if it can be installed readily in a standard flush device box, or on an outlet box cover, or otherwise used in a wiring system recognized by the National Electrical Code.

Direct current requires a switch that gives quick-break and considerable contact separation to properly rupture the arc, hence the existing snap-type switch using a quick spring-actuated mechanism. Both of these features are not the most desirable when employed on alternating current. It has long been known that switch operating characteristics necessary for safety, good performance, and long life on direct current are not the best for alternating current use.

The ideal design features of a switch for alternating current interruption are relatively slow-break and limited contact separation. It is much less destructive to allow an alternating current arc to extinguish itself when passing through current zero than ruptur-

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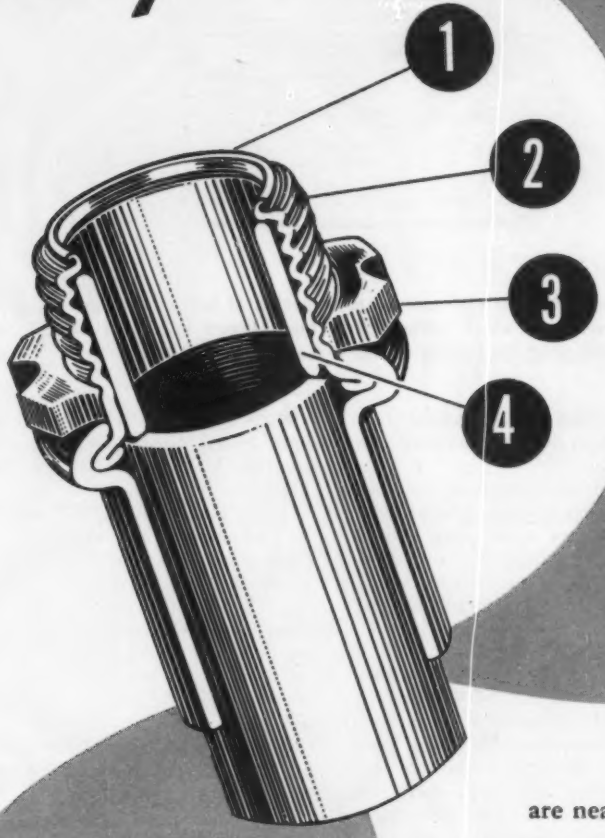
Mr. Hodgkins is an advisory engineer for the Bryant Electric Company and the Westinghouse Electric Corporation, at Bridgeport, Conn.

New B-M 21 E *Connector*

HAS *4* OUTSTANDING FEATURES



1 Smooth Rolled Edge Throat will not cut or scrape plastic insulation.

2 Full thread screws into all conduit fittings.

3 Nut screws down flush to shoulder for positive ground.

4 Internal sleeve same inside diameter as tubing insures smooth raceway for easy fishing.

All B-M Indenter Fittings are U. L. approved as Concretetight and for General Use. (File Card E 10863)

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job!

BRIEGEL METHOD TOOL CO.
GALVA, • ILLINOIS

ing it with speed and distance, as is necessary with direct current.

The Underwriters' Laboratories, Incorporated, in collaboration with the wiring device industry, has recently established a standard covering the requirements for a General Purpose a-c switch for use with alternating current only and thus has provided an entirely new approach to this control field.

The new standard covers switch current ratings up to and including 30 amperes and voltage ratings up to and including 277 volts. Current ratings are based on branch circuit ratings, i.e., 15, 20, and 30 amperes.

A switch which complies with the requirements of this standard is suitable for use with—

(1) A tungsten filament lamp load up to the current rating of the switch at 120 volts.

(2) An inductive load (transformer, fluorescent lamp ballast, etc.) up to the rated current of the switch.

(3) A motor load which draws a full-load current of not more than 80 per cent of the current rating of the switch.

A general-purpose, a-c snap switch rated at 15 amperes, 277 volts has many advantages over the heretofore conventional 10-ampere, 125-volt; 5-ampere, 250-volt general-use ac-dc switch. In comparison, it has an increased rating of 50 per cent at 120 volts and 200 per cent at 250 volts. Furthermore, since the new switch is inherently good for inductive loads up to its rated capacity, it will handle three times the load at 120 volts and six times the load at 250 volts. This is because present general-use switches are restricted by the National Electrical Code to 50 per cent of their ratings when used on inductive loads and this ruling does not apply to the new a-c switch.

Higher voltage rating

A further important and distinctive feature of the switch is that it has a voltage rating of 277 volts. It is therefore ideal for the control of fluorescent lighting where the lamp operates on 227 volts derived from a 480-volt, 3-phase, 4-wire system. The increased switch rating and the fact that it can be used up to its full rated capacity on this application gives it economic advantages since fewer switches will be needed for a given installation.

The new switch standard has permitted design features that are conducive to long life and increased performance. The salient features of the general-purpose a-c switch are—

(1) Positive closure of the contacts on make to avoid a teasing or sizzling contact condition; also to insure good performance on tungsten filament lamp loads where high initial inrush currents are encountered.

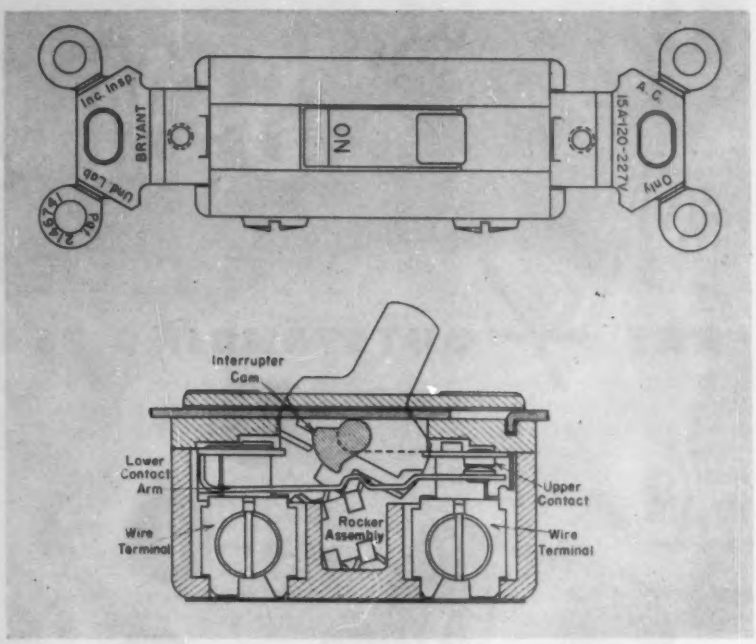
(2) Relatively slow separation of the contacts on break with limited contact separation. This is to avoid unnecessary attenuation of the arc, with its destructive effect, and permit the arc to extinguish itself by deionization of the space between the contacts when the current wave passes through zero.

(3) The use of proper contact materials, such as silver, to avoid oxidation so that overheating due to high voltage drop will not occur.

(4) Positive handle indication when in the ON position, and contacts must be fully ON or fully OFF at any stable position of the handle.

(5) A very important and outstanding feature of the switch is that it is relatively quiet in operation. This makes it very desirable for use in institutional and residential applications.

It is no longer necessary to mark the device with the symbol "T," to indicate suitability for lamp loads, nor horsepower ratings, since the switch is inherently designed, built, and tested for these applications and the UL approval mark is sufficient.



Here is shown a plan view and a cross section of one of the new a-c general purpose switches which offer many advantages over conventional snap switches designed for both a-c and d-c.

Fully enclosed in a durable plastic housing, the switch is sufficiently compact to permit maximum wiring space in a standard wall box and utilize a standard wall plate. Conventional terminal connections are provided as well as usual box mounting tabs. Incorporating the better features of design and service, the switch will provide more than sufficient cycles of operation to never require attention or replacement.

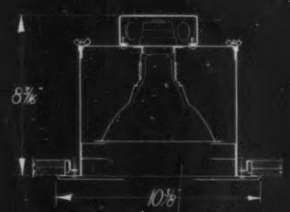
Markings well understood

The marking "AC" on an appliance or device is now well understood so there is little likelihood of misapplication. During recent years so many electrical appliances have been made available to the home, which operate on alternating current only, that the public has been educated in their proper applications.

The cooperative efforts of the wiring device industry and the Underwriters' Laboratories, Incorporated, made the advent of this type of switch possible, with resultant benefit to the consumer. It indicates an awareness and desire to keep in step with progress.

SPOT LIGHTING WITH CURTIS

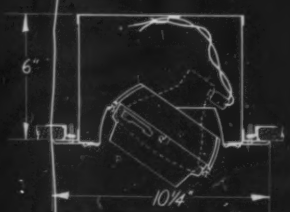
"VARI-SPOT"



CATALOG No. 2246

Curtis "Vari-Spot" is a shallow recessed downlight, utilizing one 100-watt inside frosted incandescent lamp. It is designed for use in residential and commercial interiors. An adjustable Alzak aluminum reflector permits the diameter of the circle of light to be controlled and changed as desired. Decorative holes in the finishing ring provide an attractive light pattern at the ceiling.

"PUNCHY"

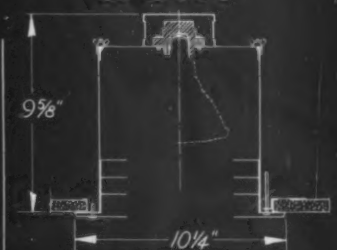


CATALOG No. 2240

Curtis "Punchy", is a shallow recessed adjustable downlight utilizing one PAR-38, Side Prong 150-watt projector spot or flood lamp. It is designed to provide punch lighting for counters, displays, show windows and other areas in store interiors.

"Punchy" features an exclusive aluminum gimbal ring which permits adjustment of the lamp to any angle 0° to 35° from the vertical, and 0° to 360° horizontal.

"SPOTTY"



CATALOG No. 2244

Curtis "Spotty" is a shallow recessed fixed downlight utilizing either one PAR-38 or R-40 screw base 150-watt spot or flood lamp. It has wide application for accent, supplementary and general lighting.

Three horizontal steel baffles, an integral part of each unit, are designed and positioned to provide an exceptionally low-brightness incandescent unit at normal viewing angles.

WRITE FOR FREE DESCRIPTIVE LITERATURE

Curtis Lighting, Inc., 6135 W. 65th Street, Chicago 38, Illinois

News of the industry

edited for Southern readers

Electrical industry organizes to coordinate promotion plans

FORMATION of a new group for the coordination of electrical industry sales and promotional programs, to be known as the Conference Group on Coordination of Electrical Industry Sales and Promotional Programs, was announced recently by member organizations.

It is tailored to fill a long existing gap in coordinating the overall sales efforts of the several national electrical industry associations.

Members presently include Edison Electric Institute, International Association of Electrical Leagues, National Association of Electrical Distributors, National Electrical Contractors Association, National Electrical Manufacturers Association, and National Appliance and Radio-Television Dealers Association.

J. R. Hartman, vice-president, The Cincinnati Gas and Electric Company, and temporary chairman of the Conference Group, said:

"The main purpose of this group will be to serve as the medium to keep the various associations of the electrical industry informed on the promotional and sales efforts of the others, and to make an effort to coordinate these activities for the achievement of maximum effectiveness."

Thus far, the Conference Group (1) has prepared an inventory of sales and promotional programs of all the associations represented on the Conference Group (this inventory is being distributed by the associations to their interested members), and (2) has recommended to its constituent associations that "Electrical Modernization" should be adopted as the basic idea around which as many as is practical of the electrical industry's sales and promotional activities should be organized.

The individual associations may interpret this idea to their specific needs.

"The members of the Conference Group believe," Mr. Hartman said, "that, if the electrical industry is to get its desired share of the consumer dollar in the competitive era ahead, it must coordinate its sales effort.

"For instance, at least 1,500,000 kitchens in American dwellings are being modernized annually—not to mention a million being installed in new houses. In fact, the replacement aspect in all electrical fields has been seriously overlooked.

"Industry can substantially increase its productivity through the use of modern electrical equipment, both for industrial drives and modern lighting. Automation can be brought about primarily through the use of more industrial electrical equipment. Electronics offer great possibilities for still further increasing our production per man hour."

In summary, Mr. Hartman concluded that the program of the Conference Group seeks to link the common objectives of the utility, manufacturer, the distributor, the dealer and contractor in coordinated advertising and promotional campaigns.

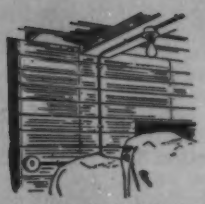
Virginia town installs fluorescent lighting

A COMMUNITY-WIDE celebration was held in Culpeper, Va., recently when the citizens of the 4,000-population town turned on the first fluorescent street-lighting system south of the Mason-Dixon line. The streamlined, six-foot-long lights, developed by the General Electric Company, are the most modern type of street illumination in the country.

More than 10,000 townspeople and visitors turned out for the day-long event, climaxed by a Brunswick stew dinner served under the new lights on the "world's longest supper table."

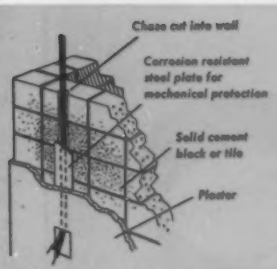
The actual "lights on" ceremony was accomplished by the lighting of the world's largest lamp bulb by the "Queen of Light," a local high school beauty. The light from the

More than 10,000 people ate a Brunswick stew dinner at the "world's longest supper table" in Culpeper, Va., recently when the town turned on its new fluorescent street-lighting system.

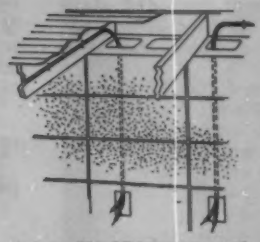


1 For locations destructive to conventional cables, Rome FlexAll is safe, non-rotting and flame resistant.

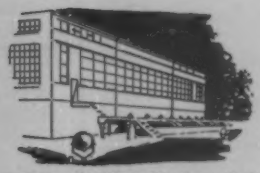
2 Buried direct in earth, Rome FlexAll is ideal for wiring between buildings.



3 Embedded in plaster, Rome FlexAll makes for neater appearance in the rewiring of old buildings.



4 Rome FlexAll is easy to work within hollow spaces of masonry block or tile walls.



5 Rome FlexAll is ideally suited for the underground wiring of floodlight installations.

Two and three conductor Rome FlexAll is manufactured in sizes 14 AWG through 10 AWG. Standard color is pearl gray, put up in 250' cartons. Two conductor construction is available with or without ground wire. Underwriters' approved as Type UF and Type NMC—600 volts.

5 ways you can use new Rome FlexAll to cut installation costs

Rome FlexAll is a new single, two, and three conductor cable designed for branch circuit and feeder services. It is the answer to low cost industrial and commercial wiring. It's ideal for amusement areas, outlying farm buildings and residences.

Rome FlexAll, single conductor, is approved by Underwriters' Laboratories, Inc., as Type UF (Underground Feeder). The two and three conductor constructions are approved as, both, Type UF and Type NMC (Non-metallic Sheathed Cable—Corrosion Resistant). Such dual approval makes Rome FlexAll the inventory-saving choice for branch and feeder circuit work.

Rome FlexAll is recognized by the National Electrical Code for 1953 for the following types of installation:

Single Conductor • For branch or feeder circuits *buried directly in earth* when provided with over-current protection.

Multiple Conductor • For branch or feeder circuits *buried directly in earth* as indicated above • For interior wiring, either exposed or concealed in dry, wet or corrosive locations • For installation within hollow spaces of outside or inside masonry block or tile walls • For embedding in plaster or shallow chase in masonry, when suitably protected.

Rome FlexAll, single conductor, has an integrally applied all-resistant Rome Synthinol, Type TW, thermoplastic insulation and sheath. Rome FlexAll, two and three conductor, is insulated with the same high quality compound, with individual conductors covered with an inorganic glass yarn wrap. Over the assembled conductors is an abrasion, rot, moisture and flame resistant Rome Synthinol thermoplastic sheath.

For *direct burial in earth or the hazards of wet and corrosive conditions . . . ask for Rome FlexAll.*

. . . It Costs Less to Buy the Best

Rome FlexAll, single conductor, is manufactured in sizes 14 AWG through 4 AWG. Standard color is black, put up in 500' cartons. Underwriters' approved as Type UF—600 volts.

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

50,000-watt bulb was caught by electric eye equipment which automatically turned on the new General Electric fluorescent street lights.

Installed in the business district of Culpeper, the fluorescents, according to R. W. Huffman, Culpeper town manager, were selected because it was felt that they would enhance the beauty of the town as well as contribute to maximum safety of motorists and pedestrians.

Guests of honor included state and municipal officials as well as members of the press and G-E executives.

The new Form 206 luminaires employ four 100-watt "rapid start" G-E fluorescent lamps which light within one second after they are turned on. The entire fixture, including the six-foot plastic housing and self-contained ballast, weighs about 100 pounds.

Culpeper is the nineteenth community in the nation to install fluorescent lights. The giant fixtures are used in downtown areas for whiteway lighting, and are operated on series or multiple circuits.

Yearly Adequate Wiring conference date set

THE TENTH ANNUAL National Adequate Wiring Conference, sponsored by the National Adequate Wiring Bureau, has been scheduled for Chicago's La Salle Hotel, February 25-26, 1954. Those desiring to attend are urged to make their reservations for room accommodations early by writing or wiring M. P. Mathewson, sales director of the La Salle Hotel, Chicago 2, Ill.

Although complete program details have not been announced, there will be a special presentation of "Old Ideas for New People," designed especially for those who have only recently assumed responsibility for adequate wiring promotion. This feature also, should not be missed by anyone who is contemplating starting an adequate wiring program for the first time, program officials stated.

The planned program is to be full of practical material for every branch of the electrical industry, with special emphasis on financing adequate wiring installations in new and old homes.

'Electrical Carnival' planned for Louisville

"A CARNIVAL of Electrical Apparatus" is to be presented in the Continental Ball Room of the Henry Clay Hotel, January 19 and 20, 1954, by the E. & H. Electric Supply Co., 626 South Twelfth St., Louisville, Ky.

There will be 40 firms represented by E. & H. with booths showing their products. This is said to be the largest public display of electrical equipment and supplies ever presented in the Kentuckian area under the auspices of an individual wholesaler.

Architects, builders, electrical contractors, electrical inspectors, purchasing agents, plant engineers and maintenance men throughout the area have been invited. A buffet lunch and musical entertainment will be provided.

The E. & H. Electric Supply Co. is one of the fastest growing elec-

CAROL REPRESENTATIVE—Kenneth R. MacLean, sales manager, The Carol Cable Co., Pawtucket, R. I., (left) discusses company plans and policies with J. A. Lloyd, Atlanta, Ga., manufacturer's representative. Mr. Lloyd has been recently appointed to represent Carol Cable in Southeastern states.

trical wholesale houses south of the Ohio, and is headed by E. J. Theobald, Jr., Harold L. Theobald, and J. B. Stengel, sales manager.

Viking assets bought by National Radiator

THE NATIONAL Radiator Co., head offices at Johnstown, Pa., announced recently that it had purchased from the owners the principal assets of the Viking Air Conditioning Corp., 5601 Walworth Ave., Cleveland, Ohio.

Marion I. Levy, president of Viking, has been elected a vice-president of National Radiator and has been named general manager of Viking which will operate as the Viking Air Conditioning Division.

Viking has been a principal producer of blowers for warm air furnaces and air conditioners, furnace humidifiers, attic and window fans.

President T. B. Focke of National Radiator stated that no changes are contemplated in personnel or in Viking's previous manufacturing and merchandising policies. While the acquisition of Viking is a further step in the direction of broadening the company's activities in the fields of heating, ventilating and summer cooling, the company has no intention of entering the furnace field.

Henderson Sales named Burndy representative

BURNDY ENGINEERING Co., Inc., Norwalk, Conn., manufacturers of electrical connectors, announce the appointment of the Henderson Sales Company as sales representatives for the St. Louis area, replacing W. L. Rose, who is retiring as a sales representative after 45 years in the electrical field.

E. E. Henderson H. J. Weisler

The Henderson Sales Co., well established as electrical representatives, presently located in offices at 8131 Manchester, Brentwood, St. Louis 17, Mo., consists of Erwin E. Henderson and Harlan J. Weisler. Mr. Henderson a graduate (B.S.) of the Missouri School of Mines and Metallurgy, entered the Henderson organization in 1946. Mr. Weisler attended William Jewel College and the University of Iowa and joined the Henderson Sales Co. in 1947.

Henderson Sales Co. will handle the complete Burndy line of electrical connectors for utilities, contractors, industrial, and electrical manufacturing applications.

Kulman made Southern Master Rule distributor

MASTER RULE Manufacturing Co., Middletown, N. Y., announces the conclusion of negotiations by which Kulman Brokerage Co., Atlanta,

N. M. Kulman

Ga., becomes the direct factory representative for its line of fine steel tape and folding rules for tradesmen, craftsmen and hardware users throughout North and South Carolina, Georgia, Alabama, Tennessee, Mississippi and Florida.

Herman M. Kulman, president, has placed ten associates in headquarters at Atlanta, Birmingham, Mobile, Jacksonville, Tampa and Richmond to service wholesalers and do creative selling and service at the retail level on behalf of jobbers.

In brief ceremonies recently at its plant in Cleveland, Ohio, the Viking Air Conditioning Corporation became the Viking Air Conditioning Division of The National Radiator Co., Johnstown, Pa. Shown here (left to right) are Herbert L. Klein, Viking general manager; Marion I. Levy, former president of Viking and now vice-president of The National Radiator Co., and operating head of Viking; John dePass, assistant secretary of National Radiator; T. B. Focke, president of National Radiator; and B. C. Straub, comptroller of National Radiator.

Vicksburg Adequate Wiring Bureau licensed

A LICENSE to operate the Residential Wiring Certification Plan, which is designed to insure homeowners that their wiring systems will be able to serve their needs conveniently and economically, was recently presented to Dan Cole, chairman of the executive committee of the newly organized Vicksburg, Miss., Adequate Wiring Bureau. Major Pat Kelly presented the license to Mr. Cole on behalf of the National Adequate Wiring Bureau.

Dates Ahead

Southeastern Electrical Wholesalers Association, "Industry Day" Meeting, Atlanta Biltmore Hotel, Atlanta, Ga., Jan. 14-15, 1954. M. L. Tice, Managing Director, 421 Rhodes Bldg., Atlanta 3, Ga.

American Institute of Electrical Engineers, Winter General Meeting, Statler Hotel, New York City, N. Y., Jan. 18-22, 1954.

Southeastern Electric Exchange - Edison Electric Institute, Joint Personnel Conference, New Orleans, La., Jan. 21-22, 1954.

The 1954 Plant Maintenance and Engineering Show, International Amphitheatre, Chicago, Ill., Jan. 25-28, 1954.

National Adequate Wiring Bureau, Tenth Annual Conference, La Salle Hotel, Chicago, Ill., Feb. 25-26, 1954.

Southeastern Electric Exchange, General Conference, Boca Raton Hotel and Club, Boca Raton, Fla., Mar. 22-24, 1954.

Southern Homes Show, first annual affair, Textile Hall, Greenville, S. C., Mar. 22-26, 1954.

Illuminating Engineering Society, Southern Regional Conference, Roosevelt Hotel, New Orleans, La., April 8-9, 1954.

Illuminating Engineering Society, Southwestern Regional Conference, Rice Hotel, Houston, Texas, April 11-13, 1954.

Southern Textile Conference, Georgia Institute of Technology, Atlanta, Ga., Apr. 15-16, 1954.

7th Annual Conference for Protective Relay Engineers, A & M College of Texas, College Station, Texas, April 26-28, 1954. Conference chairman, L. M. Haupt, c/o A & M College.

Southeastern Electric Exchange, Engineering and Operation Section, Sans Souci Hotel, Miami, Fla., May 6-7, 1954.

Edison Electric Institute, Annual Convention, Atlantic City, N. J., June 1-4, 1954.

National Association of Electrical Distributors, Annual Convention, Atlantic City, N. J., Week of June 6, 1954.

News about people

Wallace R. Persons has been elected president and a director of the **Emerson Electric Manufacturing Co.,** St. Louis, effective Jan. 1, 1954, the company has announced. Mr. Persons has been vice-president and

W. R. Persons

general sales manager of the Lincoln Electric Co., Cleveland, Ohio, for the last seven years.

As Emerson's president, Mr. Persons will succeed **W. S. Snead,** who is now both president and chairman of the board of directors. Mr. Snead has been an Emerson director since 1937 and has taken an active part in the company's management since 1942. He will remain as board chairman.

Rufus G. "Bam" Price, Jr., assistant business manager of ELECTRICAL SOUTH since June, 1952, has resigned effective January 1st to accept a position as Southeastern district manager of the **Orangeburg Manufacturing Co., Inc.,** Orangeburg, N. J. He will cover the states of Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama and Tennessee for the fibre conduit manufacturer.

R. G. Price, Jr.

An electrical engineering graduate of the Georgia Institute of Technology, Atlanta, Mr. Price served with the U. S. Navy during World War II and is a Lieutenant in the Naval Reserves.

Harry A. Miller, 1925 Cedar Springs Ave., Dallas, Texas, has been appointed Texas sales representative by the **Abolite Lighting Division** of Jones Metal Products Co., West Lafayette, Ohio, for their entire line of porcelain enamel lighting reflectors.

Mr. Miller is widely known as an engineering specialist in industrial

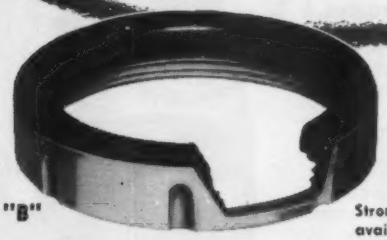
Harry A. Miller

and commercial lighting. He was associated with General Electric in St. Louis and the Illinois-Iowa Power Company before moving to Dallas where he served as lighting engineer for Westinghouse in Texas and Oklahoma. In 1947 he established his own firm. Mr. Miller is a member of the Illuminating Engineering Society and was a charter member of the Spirit of St. Louis Chapter, transferring to the Dallas Chapter in 1943.

I. W. Strong, Denver sales representative of **Appleton Electric Co.,** has been appointed assistant to the vice-president in charge of sales and will now make his home in Chicago, the home office of the company.

Mr. Strong is a graduate of electrical engineering from Purdue University, is a member of the Illuminating Engineering Association of America, the American Institute of Electrical Engineers and holds his professional engineer's license in the State of Indiana.

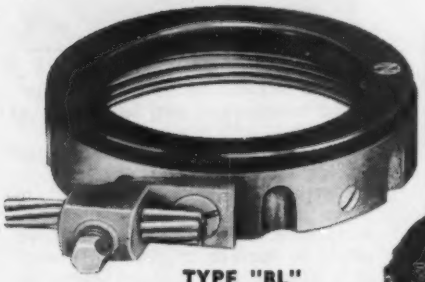
THERE'S AN O.Z. BUSHING FOR EVERY JOB



TYPE "B"

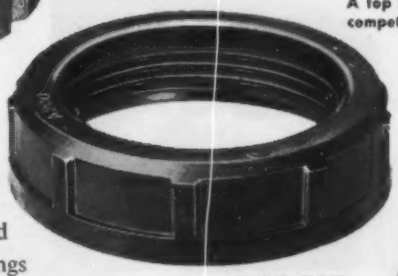
Strongest insulating bushing available! Exclusive design permanently locks insulation into casting.

Finest, high-strength, all-Bakelite insulating bushing. A top quality bushing—competitively priced!



TYPE "BL"

Same as proven Type "B" with lug for quick, positive ground connections. Set screw in casting facilitates positioning.



TYPE "A"

All-Bakelite bushing with male thread for insulation of exposed cables passing through holes in metal boxes or troughs.

TYPE "BB"

Over 35 years of specialized experience in the design and manufacture of conduit fittings is behind the complete line of O.Z. insulating bushings. Whatever your insulating bushing problem, you can be sure there is an O.Z. design to fit your application perfectly. Buy O.Z. bushings from your local electrical distributor.

O.Z. ELECTRICAL MANUFACTURING CO., INC.

262 BOND ST. • BROOKLYN 2, N. Y.

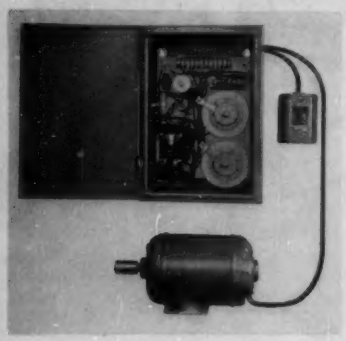
CAST IRON BOXES • SOLDERLESS CONNECTORS
CABLE TERMINATORS • GROUNDING DEVICES
POWER CONNECTORS • CONDUIT FITTINGS

Representatives in all principal cities

New products

Adjustable motor drives

CLARK CONTROLLER CO., 1146 E. 152nd St., Cleveland 10, Ohio, has announced their Bulletin 6520 Vari-Amp magnetic amplifier motor drive. This is a compact, self-contained unit which will provide adjustable motor speeds from an AC power source. It converts AC power from a 115 volt 60 cycle source to DC power which is used to drive a DC motor. Speed is continuously ad-



justable over the complete range by means of the small rheostat located on the control station.

The standard unit will provide for a speed range of 10 to 1 and is available with motors ranging in size from 1/40 HP up to and including ½ HP.

The unit consists of three components, the main control panel, the control station and motor. It is completely self-contained including in addition to the variable armature supply, field supply, control circuit, and short-circuit and overload protection.

The basic unit is provided with an on-off switch and speed adjusting rheostat on the control station. Optional features include jogging, dynamic braking and reversing.

Remote terminal unit

A REMOTE CONTROL terminal unit that responds to and channelizes telephone dial-actuated pulses to perform selective switching operations is now being produced by The Hammarlund Manufacturing Co., Inc., New York 1, N. Y.

The unit, designated the PCU-2 Pulse Counting Unit, is operated from a telephone type dial at the control center over a transmission media using either audio tone or DC telegraph signals.

A typical application is in its use for selecting any one of 10 telemetering circuits when only one transmission circuit is available for sending metered information. In this case the PCU-2 selects the metering circuit requested from the control point. It may also be used for controlling transmitters, receivers, lights, motors, pumps, valves and any other item that can be adapted to electrical control.

Concentric-ring luminaires

NEW DESIGNS of concentric-ring luminaires have been announced by Westinghouse for silvered-bowl incandescent lamps. These fixtures are made for lamps in all ratings from 200 to 1000 watts.

Three vertical rings are placed concentric with the lamp axis to shield the bright neck of the lamp. With this arrangement, the light is

directed by the reflector in the base of the lamp to the ceiling without the light source being visible at any normal viewing angle. Since the shielding ring surfaces are vertical, dirt and dust collection are minimized. Maintenance becomes essentially nil. The reflector inside the lamp is permanently clean. Because the bottom of the lamp is exposed, a burned out lamp can be changed from the floor by a suction cup device on the end of a handle.

These luminaires have 45-degree universal swivels at the ceiling canopy so they may be used with sloping ceilings. The hanger is designed for easy attachment to outlet box screws or to a three-eighths-inch stud.

For further information, write Westinghouse Electric Corp., Box 2099, Pittsburgh 30, Pa.

Manual remote control

A NEW MANUAL remote control for operating Type H oil circuit reclosers has been developed by the Line Material Co., Milwaukee 1, Wis. Affording savings in operating costs, this control provides an accessible handle near the pole base and eliminates the need for climbing.

The remote control is designed for attachment to the recloser's sleet hood. It consists of a permanently lubricated mechanism that engages the recloser operating handle, a

housed flexible cable, and an operating handle that can be locked to prevent unauthorized operation.

Although its operating handle may be locked, the control still allows the recloser operating handle to move to lockout position without interference. The device can be used either to open or to close a recloser. It is available for ganged operation of one, two, or three reclosers of multiphase installations.

Distributor display

THE EDWARDS CO., Norwalk, Conn., has introduced a new display panel for use in distributor sample rooms. The panel is white and blue and is 30 inches wide by 18 inches deep.

Manufactured of 3/16-inch composition board, with all equipment mounted and the bells, buzzers and push buttons operating, the panel may be displayed on the counter or hung on the wall.

It is available in limited quantities. Orders may be placed direct with the company or through an Edwards representative.

Low-cost time switch

THE SANGAMO Electric Co., Springfield, Ill., is now producing a quality time switch for the low price field. It is a NEMA Standard 30 ampere rating, single-pole, single-throw switch that employs the same slow-

what are your needs

Southern Electrical Corporation
manufactures highest quality

DISTRIBUTION and
TRANSMISSION
CONDUCTORS
STEEL STRAND
CABLE ACCESSORIES
WEATHERPROOF
CONDUCTORS

(Aluminum or Copper—
Neoprene or Type URC—
Neoprene Triplex)

Southern Electrical Corporation

CHATTANOOGA, TENNESSEE

Write, wire or phone your needs to us. We will tell you when to expect delivery — and you can count on it. Our own trucks make deliveries anywhere in the Southeastern area within 48 hours.

IN THE HEART OF THE SOUTH

speed hysteresis motor and synchronous timing mechanism used in this manufacturer's well-known line of heavy-duty time switches.

The entire mechanism is enclosed in a sturdy gray steel case with a hinged cover and sealable hasp. The switch measures 4¼" x 7¼" x 3⅛" overall. Ample space for wiring (nearly half the inside space), four convenient multiple knockouts, and a keyhole mounting slot permit fast, labor-saving installation.

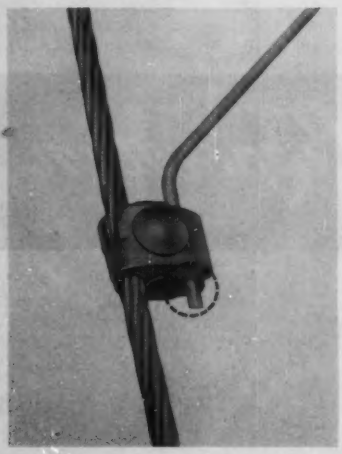
Heavy silver contacts, insulating safety shield, four levers for two "on" and two "off" operations, and easily manipulated trippers are additional features. The switch carries an 18-month guarantee. For further information on this Type B time switch, write the company for Catalog Sheet No. 1020.

Parallel groove clamp

A NEW, IMPROVED design for the aluminum-copper parallel groove clamp has been announced by Jasper Blackburn Corp., St. Louis, Mo.

This new design incorporates a recently developed process of manufacture which eliminates the use of solder in attaching the copper liner to the cast aluminum body. By using this process no moisture trapping voids or fluxes can develop between liner and body to foster galvanic corrosion.

The aluminum body is pressure cast around the pronged copper liner. Because the aluminum body has a greater coefficient of contraction



than the pronged copper liner, it exerts great clamping forces against the prongs as the molten aluminum solidifies. This air-tight shrink fit permanently seals out moisture.

Operating temperatures under the most severe conditions never approach the heat of the aluminum in its molten state, therefore high clamping forces against the pronged liner are retained and the liner cannot come loose.

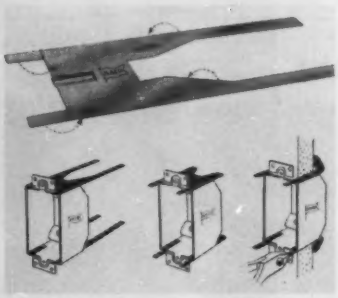
Special surface treatment of the underside of the copper liner reduces the surface tension of the molten aluminum. This establishes an intimate low-resistant contact between the two metals.

The aluminum body of this clamp is cast of a special alloy, selected for its high corrosion resistance. This alloy is exceptional in that it also combines high strength with ductility. Steel bolt, nut and lock washer are hot dipped galvanized. One clamp covers a wide range of popular conductor sizes in order to simplify stocking problems.

Box gripper

ELECTRICAL OUTLET boxes can be installed in 47 seconds, with the new Raco Box Gripper. This simple device clamps any standard-size box securely to any type of wall—wallboard, wood, plaster, tile, or concrete block. This Gripper is a recent development of the Raco division of All-Steel Equipment Inc., Aurora, Illinois.

Installation of an outlet box requires only two Raco Box Grippers.



They are easy to use. Just lay the gripper on the box, bend gripper lugs over the end of the box and bend tabs forward. Insert the box in the wall and pull gripper tabs up snug. The box is then solidly and permanently fastened to any type of wall. These Grippers can be used on any single or multiple wall box.

Non-metal clamp

A NON-METAL clamp for lineman's rubber blankets which can be applied easily and quickly yet offers maximum safety protection has been re-designed by the Surety Rubber Co., Carrollton, Ohio.

The clamp is a modification of an earlier model introduced several years ago by Surety Rubber, and is now being manufactured in two sizes—7½ inches and 10½ inches —both designed to fit comfortably in a lineman's glove.

Made completely of wood, with the exception of three bands of rubber which furnish the spring action, the clamp contains no metal to conduct current or to interfere with its serviceability. The jaws are of smooth finish, close-grained poplar, and work on a wooden spool fulcrum. The clamp can be ordered with or without a dowel pin on the lower jaw. The pin is made to fit into the blanket holes but many linemen prefer the smooth jaw to permit clamping onto any part of the blanket.

Combination starters

A NEW LINE of A.C. combination starters with disconnect switches, designed and built in accordance with J.I.C. standards, has been announced by Ward Leonard Electric Co., Mount Vernon, N. Y. Known as Bulletin 4120 J.I.C. Starters, they are intended for use wherever nonreversing magnetic across-the-line

starters with disconnect means at the starter location are specified. Typical applications are in automotive and industrial plants where controls are subjected to splashing oil or coolant.

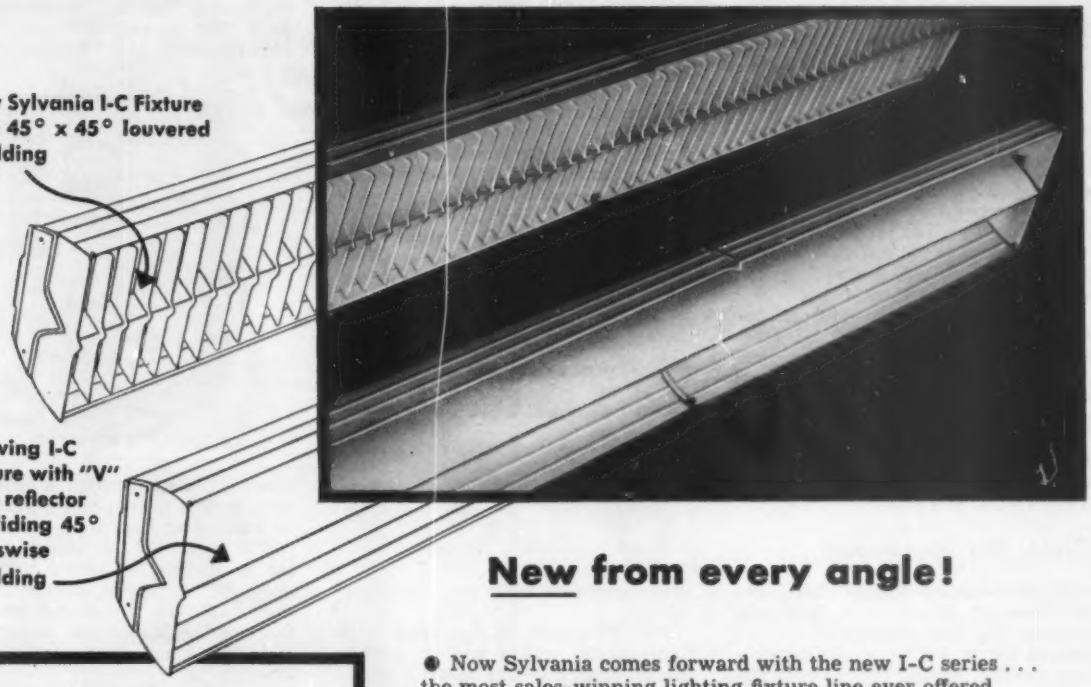
Component parts include a magnetic full voltage starter, a dual voltage control transformer and pilot circuit fuse in combination with either a fusible or non-fusible disconnect switch. All parts are fastened to a removable steel panel mounted in a NEMA Type XII enclosure.

Outstanding features are compact construction; quick make and break disconnect switch mechanically interlocked with cover; front of board wiring; removable mounting panel secured by quick release cam type fasteners; external mounting holes, oil clearance pads on rear of enclosure; easy access to shallow box for component inspection and maintenance.

Fluorescent luminaires

A NEW LINE of high quality plexiglas fluorescent luminaires, in a wide range of sizes and shapes, is now available. Designed by Gruber Lighting, 125 S. First St., Brooklyn 11,

Sylvania Announces! A New Industrial-Commercial Fluorescent Fixture Line!


New Sylvania I-C Fixture with 45° x 45° louvered shielding
Showing I-C Fixture with "V" type reflector providing 45° crosswise shielding

New from every angle!

● Now Sylvania comes forward with the new I-C series . . . the most sales-winning lighting fixture line ever offered.

It's another high quality Sylvania line, including today's most wanted features. Amazingly versatile, too, with 4, 5, and 8 foot units specifically designed to meet the lighting needs of offices, stores, schools and factories. Ideal for critical seeing tasks such as those encountered at printing plant composing stones or in the machining of specular metals.

And, it's a right-priced line to help you win contracts in both *industrial and commercial applications.*

Remember, this Sylvania I-C line is designed, built and tested and *fully guaranteed* for one year by Sylvania. For detailed information see your Sylvania representative or write directly to: Sylvania Electric Products Inc., Dept. 4X-2501, 1740 Broadway, New York 19, N. Y.

Quality built and packed with these advanced features:

45° x 45° Louvered Shielding—Direct Glare is kept to a minimum when 45° x 45° louver shielding is used.

60%-40% Distribution — Distribution from I-C fixtures is 60% downward and 40% upward, providing a strong direct component for high levels of illumination.

Versatile and rugged, too! — Channels are die-formed of 20-gauge steel. Made with extra knockouts to provide flexibility of installation. Designed for individual or continuous-row installations, pendant or surface mounting. Metal parts Bonderite treated to resist deterioration. Channels, louvers and steel panels finished in Sylvania's high-temperature baked Miracoat, providing 86% reflectivity.

T-17 Low Brightness Unit — The I-C line has been designed to accommodate the 40-watt 60-inch T-17 low-brightness lamp, meeting the need for a unit with minimum shielding. Combines low brightness, comfortable illumination with high efficiency and easy maintenance.

SYLVANIA

LIGHTING · RADIO · ELECTRONICS · TELEVISION

In Canada: Sylvania Electric (Canada) Ltd.
University Tower Building, St. Catherine Street, Montreal, P. Q.

N. Y., to exacting specifications, these units have chassis of 18 gauge cold-rolled steel, finished in baked white enamel with 89 per cent reflectance.

Available for recessed, surface or pendant mounting, the units afford flexible application in almost any commercial or institutional interior, regardless of ceiling height. The white plexiglas shielding is sturdy and durable, permanently retaining its high transmittance, color and dimensions.

Light weight of the plexiglas diffusers effect a substantial reduction in overall fixture weight, providing unusual ease of handling and installation. For efficient and dependable operation, all of the units are equipped with high power factor ballasts and use standard fluorescent or slimline lamps. The many sizes and shapes of units in this new line are suited to a wide variety of lighting design techniques.

Units may be used individually to create lighting patterns and effects which conform to and complement interior decorative themes, or the units can be combined in particular configurations of light source. The soft, diffuse light distribution from these units affords glare-free illumination of appreciable intensity and reduces harsh ceiling contrast and objectionable brightness ratios.

A copy of the 16-page illustrated Folio P-54 on these units is available from the company.

Circle Air baseboard

PALEY MANUFACTURING Corp., 244 Herkimer St., Brooklyn 16, N. Y., announces the manufacture of an improved Circle Air baseboard convection electric heating system incorporating a new Eutectic safety principle described as "absolutely foolproof." The built-in safety device,

which is approved by Underwriters Laboratory, prevents heat within unit from rising above 217°. It automatically breaks the current at this temperature, eliminating any danger of fire.

The Circle Air baseboard unit is claimed to be the only unit of its kind that can be installed directly on the floor with complete safety. Even if grill opening is obstructed by rugs, furniture, etc., there is no danger of fire. The entire system is UL approved, and each unit has a built-in thermostat or wall thermostat that provides maximum efficiency, minimum waste.

Using electricity as fuel, Circle Air saves space, eliminating all need for furnaces, pipes, chimneys, fuel storage and fuel dirt. These units, encased in handsome grey hammertone metal cabinets are only 3" in depth, 10" high, can be installed recessed or free standing.

Three sizes are available in 700, 1050 and 1400 watts, 115 and 230 volts, with built in or wall thermostat.

Fluorescent fixture

THE PLYMOUTH, another new development in the fluorescent lighting fixture field, announced by Smithcraft Lighting Division, Chelsea, Mass., is especially designed for stores, offices, banks, schools, and all other commercial and institutional installations. Its outstanding, overall illumination is enhanced by the luminaire's smooth graceful lines

that harmonize with any surroundings.

The Plymouth is equipped with Smithcraft's socket holder bridge, the development that makes it possible to change the number of lamps or lamp spacings at any time. This means that the intensity of illumination can be varied in the field to meet existing or changing requirements—without removing the fixture.

The Plymouth is general diffuse in light distribution, with sides and bottom shielded by ribbed frosted prismatic glass panels to assure an extremely comfortable low brightness. By installing special top reflectors, additional down-lighting may be obtained if desired.

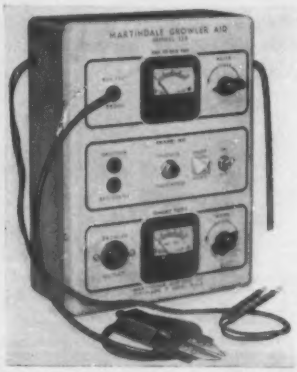
Circuit breaker

A NEW STAB-LOK Circuit Breaker, Type NC, is now being produced by Federal Electric Products Co., Newark, N. J. The major feature of the new circuit breaker, available in 15 and 20 amps., is its slim, space-saving construction which permits two of these Type NC Stab-loks to be stabbed in where only one breaker would fit before.

Vital to the versatility of the Stab-lok system is the new "Magic E" design of slots in the enclosure bus bars. These "Magic E" slots can take two of the new, thin single pole Type NC Stab-loks in each "E" slot; Stab-lok Type NQS, 1, 2, and 3 poles, 15-50 amps.; Type NA single pole Stab-lok, 15-20 amps.; and the simultaneous trip, double pole Type NA Stab-loks, 15-50 amps.

Windings testing device

MARTINDALE Electric Co., 1361 Hird Ave., Cleveland 7, Ohio, has announced the new Growler Aid, Model 153. This is a newly designed device for the refinement of tests on armature and stator windings before



assembly. Discovery of winding defects at this point saves a great deal of labor and expense.

The Model 153 Growler Aid checks for short circuits, open circuits, and grounds. Sensitive meters on the short-test and bar-to-bar-test sections of the Model 153 show up defects by means of comparative readings.

Part of the tests are made in conjunction with a Growler, such as Martindale types U-2 or B-1. Other tests, such as the 500 volt ground test, can be made without the use of a Growler.

Polarized adapter

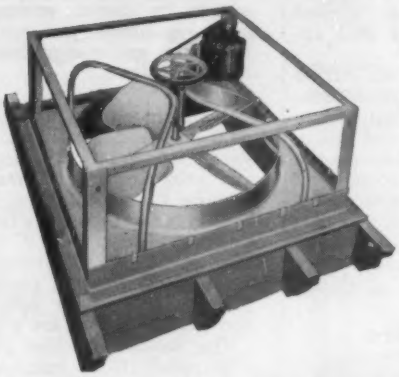
NEWLY-DESIGNED and completely interchangeable with all other makes, the Rodale Manufacturing Co., Inc., Emmaus, Pa., announces production of its Catalogue No. 1032, a 2-wire to 3-wire polarized adapter.

Ideally suited for conversion of a 2-wire system to a 3-wire polarized grounding system, this adapter is also available with a 3-inch lead as 1032L. Up to an 8-inch lead on 1032L will be supplied, upon request.

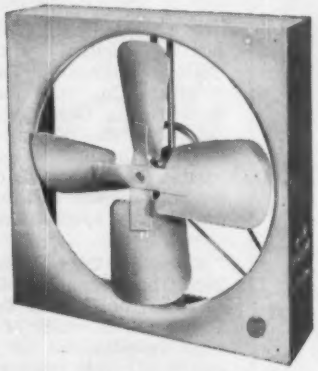
The third blade is grounded by means of a binding post at the side of the body. It features double-wiping contacts, self-finding slots for extra safety factors, and a durable bakelite construction. It is rated 10 Amps, 250 Volts and 15 Amps, 125 Volts.

LAU 1954 Fan Facts

Here's the LOW-COST way to add Sales Appeal to every home you build!



LAU "Niteair" Rancher Fans. Available in sizes and air delivery to meet every need. Balanced, free of vibration, built for quiet, trouble-free service.



LAU "Niteair" Panel Units. Residential, commercial and industrial fans adaptable for any practical application in homes, apartments, stores, office and industrial plants.

Today's home buyer wants his new home completely equipped with the latest in modern conveniences. BUT . . . he doesn't want to pay high additional costs for these comforts.

That's why a LAU Fan answers your problem. At a low cost, a LAU "Niteair" Fan offers the home owner the ultimate in cool, refreshing, healthful slumber. During those hot summer months he'll sleep cool as a cucumber in a house that YOU built and SOLD him.

Quick . . . easy . . . economical to "install-when-you-build". The LAU Fan is the quickest way to a prospect's heart and POCKETBOOK. For more sales, more profits, plan to install tested, proven LAU "Niteair" units in your next project!

Certified Ratings — PFMA — UL

Guaranteed 5 Years

Lau fan ratings are Certified by the PFMA and carry UL approval. Fans are guaranteed for 5 years and motors carry a one-year warranty.

THE LAU BLOWER COMPANY, 2019 Home Avenue • Dayton 7, Ohio

Write today for catalogs and further information.

Free bulletins

available to our readers

A new 16-page catalog has been released by **Bage Lighting Co.**, 5400 Chester Ave., Cleveland 3, Ohio, which describes the company's complete line of outdoor and indoor fixtures. All of the fixtures are lantern style, and are designed for a variety of purposes. The catalog includes specifications, sizes, and order numbers.

A revised and enlarged edition of the booklet "How Time Controls Save Work, Time and Money on the Farm" has been announced by the **Paragon Electric Co.** of Two Rivers, Wis.

The revised edition includes new time control applications devoted to showing farmers how to earn more money by actually doing less work. Actual applications are described which are of special interest to poultry farmers, dairy farmers, hog raisers, greenhouse operators and general farmers. Utilities will find the booklet especially valuable where emphasis is placed on load building in rural areas.

A new edition of "Cutting Production Costs with Electronic Controls," a handbook of **Photoswitch, Inc.**, for engineers, working with production executives and management personnel working with electronic control, has been released recently.

The handbook, available from Photoswitch, 77 Broadway, Cambridge 42, Mass., at no charge, contains 46 new case studies. The studies explain clearly and factually how standard packaged electronic controls have solved many problems of weighing, counting, measuring, timing and cycling, thereby achieving efficiency through the use of these controls for all types of industrial applications.

Luminous Ceilings, Inc., Chicago manufacturer of Acusti-Luminus Ceilings, has just published a brochure, "Design Data and Laboratory Tests on the Use of the Plenum above Acusti-Luminus Ceilings."

While luminous ceilings have customarily been hung below existing air conditioning ducts, by virtue of its highly adaptable design, it has proved practical in areas not already equipped with ducts to allow the soffit above the diffuser to act as an air conditioning plenum. While the economy of such arrangement is obvious, technical information was lacking to permit the air conditioning engineer to make all his necessary calculations. It was discovered that the engineer would ask, almost invariably, "How do I figure the air distribution for this ceiling?" followed immediately by, "What are the thermodynamics of air flow through the plenum where a good proportion of the sensible load appears to be concentrated?"

The booklet, based on tests carried on by the Illinois Institute of Technology at Chicago, was designed to answer these questions and many more which may arise concerning the use of the plenum for heating and/or ventilating. The brochure de-

scribes in some detail, supplemented by graphs and illustrations, such elements as Pressure Loss, Flow Pattern, Heat Transfer, Plenum Supply (Feeder Duct Arrangements, Sidewall Grille Feeders, Multi-Vent Valve Feeders), and plenum Exhaust (Grille, Perforated Outlet, High Velocity Outlet), together with additional material on sound absorption and acoustical characteristics.

Requests for the brochure should be addressed to: Engineering Department, Luminous Ceilings, Inc., 2506 West North Avenue, Chicago 47, Illinois.

A new 16-page booklet, OK-1070, published by the **Okonite Co.**, Passaic, N. J., contains the latest information on insulated aluminum power cables. It is based on two AIEE papers presented by E. E. McIlveen, Cable Engineer, the Okonite Company, at the Aluminum Symposium at the 1952 Fall Meeting in New Orleans and entitled "Significant Characteristics of Insulated Aluminum Cables" and "Insulated Aluminum Cables in Industrial and Utility Applications." This bulletin reviews the properties, problems and advantages of insulated aluminum cables. In addition, resistance ratios, current carrying capacity conversion factors and size comparisons for equal voltage drops are included.

A new bulletin on 720-cycle control systems for off-peak control of water-heating loads has been announced as available from the **General Electric Co.**, Schenectady 5, N. Y.

The 28-page two-color bulletin, designated GEC-931, contains information on station equipment, coupling equipment, and load switches, the three major components of the control systems.

An eight-page illustrated booklet on the Type E, totally-enclosed, nonventilated dry-type transformer is available from the **Westinghouse Electric Corp.**, Box 2099, Pittsburgh 30, Pa. Made in ratings from 3 to 50 kva for either indoor or outdoor service, the transformer provides greater economy for plant distribution systems where dirt, lint, and non-explosive dust are a problem.

The booklet discusses the savings that result from reduced maintenance, the elimination of vaults or protective barriers, the ability to run high voltage close to the load, and the ease of handling because of the smaller, lighter unit.

A new bulletin, Number 514-515, has been issued by the Industrial Controls Division of **Federal Electric Products Co.**, 1429 Park St., Hartford 6, Conn. Describing in detail the company's line of combination motor starters, the booklet is copiously illustrated with photos of the various types available and includes detail drawings of special features.

Cavalier Corp., Chattanooga 2, Tenn., has prepared a **Guide for Calculations of Electric Space Heating.** It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples. It explains the fundamentals of calculating heating requirements for homes, offices and industrial installations, and the correct application of the equipment to insure satisfaction to both user and electric power distributor. Request your copy on your business letterhead.

The complete line of **Heinemann outdoor service equipment** is detailed in the new 12-page Bulletin No. 2016, recently published by the **Heinemann Electric Co.**, Trenton 2, N. J.

Designed to make easier the selection of Outdoor Service Equipment, the new bulletin combines descriptive data on all available stand-

ard equipment—service entrance, receptacle type, dual control, three-phase units. Typical assemblies of circuit breakers and the various enclosures are listed for each type of equipment. Also included is a comprehensive guide to the entire line, showing catalog numbers, hub sizes, voltages, ampere ratings and other specifications.

The new bulletin explains the hydraulic-magnetic operating principle of Heinemann circuit breakers, and pictures the various circuit breakers available for use in all types of outdoor service equipment.

Copies of the bulletin are available from the company on request.

Twenty time-saving techniques for **making hot line repairs and replacements** are detailed in a new 72 page spiral-bound, pocket-size book for on-the-job use. Included are useful charts giving the characteristics of all bare conductors. All **Kearney Hi-Line Tools** and accessories for performing any hot line job are fully illustrated and described. Copies may be obtained promptly by writing to the James R. Kearney Corp., Dept. HF, 4236 Clayton Ave., St. Louis 10, Mo.

Murray Manufacturing Corp., 1250 Atlantic Ave., Brooklyn 16, N. Y., has announced the publication of a new four page bulletin on it PJ series of **fusible service equipment.** The bulletin describes in detail the many special features of this series and gives examples of how the PJ line can be used on residential, commercial, and light industrial applications.

Advance Transformer Co., Chicago, has just completed the compilation and printing of a 20-page catalog on **fluorescent ballasts** and their use. It tells the story of fluorescent ballasts, the principles of design necessary to obtain the maximum effectiveness with the power available and shows schematically, wiring and circuit steps for easy reference. Included are data sheets on available Advance Ballasts and a comprehensive installation and operation section and testing procedures.

The booklet is available to the trade upon request by writing to Advance Transformer Co., 2950 N. Western Ave., Chicago 18, Ill.

Catalog folder No. 911, **"Peerlite by Guth."** has been announced by the **Edwin F. Guth Co.,** 2615 Washington Blvd., St. Louis 3, Mo. Copies of this new 8 page booklet are available from the company upon request.

The booklet is designed for the lighting specialist, giving complete engineering data and dimensions. It is well illustrated and emphasizes the beauty, efficiency, and flexibility of the modern air cooled fluorescent fixture.

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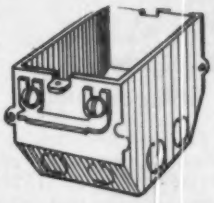
Because it's good business to do business with wholesalers

AND SPECIFY THESE TIME TESTED LINES:—



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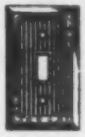
Solid Switch Box for economy.

ASK FOR NEWART for all your switch and outlet boxes and covers.



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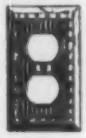
ELEC. MFG. CO.

PROVIDENCE, R. I.



The Old Reliable Design WALL PLATES

USED BY SOME OF THE BIGGEST INDUSTRIAL PLANTS. FUSES BY COMMERCIAL ENCLOSED FUSE CO.

TRY THEM — YOU'LL BUY 'EM BECAUSE THEY ARE FINE QUALITY AT LOW COST.

AMPLEX LAMPS FROM INSIDE FROSTED

THROUGH MERCURY VAPOR. THE LARGEST ASSORTMENT AVAILABLE.

DURA STARTERS are thoroughly tested and proven. More Dura Starters are ETL approved than any other line. You'll be right in holding out for DURA.

Star-A Electric Mfg. Co., Inc.

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CORD SETS SPECIALTIES

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Accept NO substitute for

JER-O-LIERS

manufactured by

JERYL LIGHTING PRODUCTS CO.

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For POT, Thermostat Cable, and Bell Wire ask for

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WIRE AND CABLE

FOR MORE VOLUME, GREATER PROFITS, AND TOP QUALITY INSIST ON THE BEST—

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WE MAINTAIN STOCKS OF ELECTRIAL DEVICES IN OUR WAREHOUSES

Just off the press are two new catalogs of contemporary lighting fixtures from **Prescolite Manufacturing Corp.**, Berkeley, Calif., and Neshaminy, Pa.

Catalog No. R-8 has to do with Recessed lighting. It contains 12 pages in color, is fully illustrated, detailing dimensions, wattage and framing-in details for flush lights.

"Surface Fixtures and Portable Lamps" is the topic treated in 8-page catalog No. S-3. This catalog illustrates in detail a complete line of modern fixtures, available in a wide range of decorator colors and finishes —ideal for redecoration as well as new construction.

Copies will be sent upon request. Address Prescolite Manufacturing Corp., 2229 - 4th St., Berkeley 10, Calif.

Hevi Duty Electric Co., Milwaukee 1, Wis., announces a new manual entitled "Operation and Maintenance of Dry Type Transformers." This manual was written to guide management, electricians, and maintenance personnel in the proper installation and care of dry type transformers.

The simple trouble chart, included on page 9, helps find trouble spots and gives the necessary remedies. Free copies are available for the asking.

Technical books

for the electrical man

Radiotron Designer's Handbook, 4th edition

Edited by F. Langford-Smith. Published by Radio Corporation of America, Harrison, N. J. 1522 pages, illustrations, index and references, price $7.00.

This new fourth edition of the *Radiotron Designer's Handbook* thoroughly covers the design of radio and audio circuits and discusses in detail, from the viewpoints of theory and practice, the design considerations necessary for the proper use of electron tubes and circuit components.

It includes 1000 illustrations, bibliographies and references totaling more than 2500 items, and an extensive 50-page index containing 7000 entries. A partial listing of topics covered: Radio Tubes; General Theory and Components; Audio Frequencies; Radio Frequencies; Rectification, Regulation, Filtering and Hum; Complete Receivers; and Sundry Data.

The Radiotron Designer's Handbook, inspired and edited by F. Langford-Smith, is the result of the combined efforts of 33 author-engineers. Written for the design engineer, student, and experimenter, this 1500-page handbook is an essential addition to your library. Circuit design and applications are discussed not only from the theorectical and mathematical approach but also from the practical standpoint of the circuit experimenter. You will find this book an invaluable aid both in the laboratory and at the workbench.

Principles of Transistor Circuits

Edited by Richard F. Shea. Co-Authors: Woo Foung Chow, Sorab K. Ghandi, Edward Keonjian, Vernon P. Mathis, Charles A. Rosen, John S. Saby, Johannes S. Schaffner, Richard F. Shea, and Jerome J. Suran, all members of the engineering staff of the Electronics Laboratory, General Electric Co., Syracuse, New York. Published by John Wiley & Sons, Inc., 440-4th Ave., New York 16, *N. Y. 535 pages, price* $11.00.

This book on Transistors is the work of nine General Electric experts who are currently engaged in transistor research and development—men who have watched the transistor from conception.

Principles of Transistor Circuits brings out the fundamental theory plus elaboration of various techniques applicable in the field. It is

"Hey, Joe, let's take another look at that wiring diagram."

- Wide Choice of Horizontal or Vertical adjustments.
- Degree Marked for Accurate Setting.
- Accommodates 300 to 1500 Watt GS or 750-1000 Watt Bi-Post Lamps.
- Offer Two Distinctive Beam Spreads.
- All Adjustments on Right Side for Safe, Convenient Servicing.
- Easy to Wire and Maintain.

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Are you acquainted with the complete REVERE line? You'll find exactly what you need for the job you are working on and save a lot of time shopping around. And, you can bank on REVERE construction—it's sturdy and will render many years of service. Write us today.

REVERE ELECTRIC MFG. CO. 6005 BROADWAY CHICAGO 40, ILL.
INDOOR & OUTDOOR LIGHTING FOR EVERY NEED

. . . THE OTHER THREE CAN USE

750-1000-1500 WATT ENCLOSED FLOODS

18 and 20 in. REAR SERVICE FLOODS

"ENDOVAL" MERCURY VAPOR LUMINAIRE

300 to 1000 WATT ENCLOSED FLOODS

AREA LIGHTER WITH TOP FLOODS

an integrated treatment of the most valuable information scattered through hundreds of articles in dozens of journals, plus new material published for the first time.

The book shows the resemblances to vacuum tube circuits, and supplies concrete data on every phase of the subject, including bias stabilization, audio amplifier design, high frequency amplifier design, and computer and similar uses.

Transistors and Their Applications

By Louis E. Garner, Jr. Published by Coyne Electrical School, Chicago, Ill., and distributed by Howard W. Sams Co., 2201 East 46th St., Indianapolis 5, Ind. 105 pages, price $1.50.

Transistors and Their Applications is an entirely new book. It was especially written as a guide and reference volume to provide a practical explanation of these "wonder mites," transistors.

The author, Louis E. Garner, Jr., is well qualified to write on this subject. He has written many articles on Transistors, which have appeared in the country's leading technical magazines. He has been a technical consultant for many years for several large electronics engineering companies and has written a great deal of material for one of the largest radio-television schools in the country.

The book is profusely illustrated with photographs and easy-to-follow schematics. A "how-to-do-it" practical approach was used throughout. Every effort has been made to slant the data toward maximum value to the practicing serviceman, technician, or anyone interested in electronic development.

It is the author's opinion that transistors will play a most important part in the future of radio-television-electricity and all phases of electronics. It is therefore paramount that the present day serviceman acquaint himself with what transistors are and what they can do. This book will be very helpful in answering these questions.

AM-FM Servicing Short Cuts

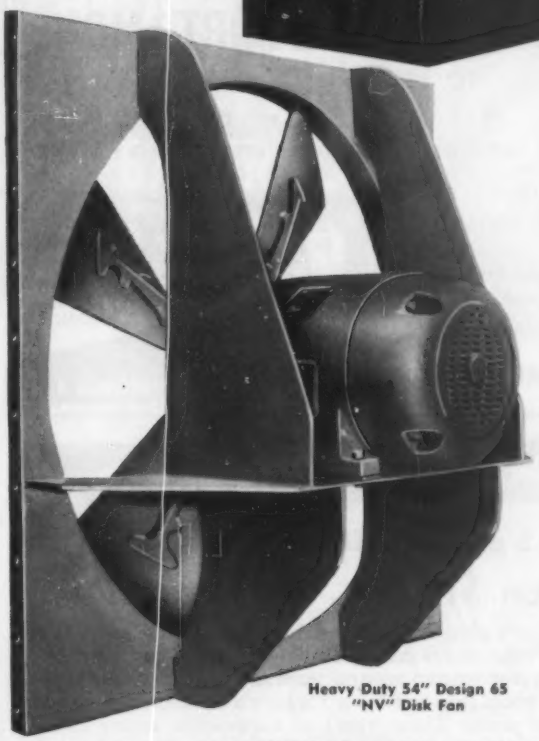
By Milton S. Kiver. Published by Howard W. Sams & Co., Inc., 2201 East 46th St., Indianapolis 5, Ind. 152 pages, price $1.50.

This book approaches radio receiver servicing by presenting actual case histories giving the type of receiver, nature of the symptom, diagnosis of the trouble, and repair technique employed. The servicing

"Buffalo" FANS

NEW

Efficient, Easily Installed PROPELLER FANS for Factory Ventilation!



Heavy Duty 54" Design 65 "NV" Disk Fan

New NV-BREEZO Line In Size Range Up To 84 Inches, Or 90,000 CFM

These new, larger "Buffalo" Package Units are specifically designed to solve practically any factory ventilating problem. Often, they can handle jobs that formerly called for much more expensive units. And, they provide steady performance with minimum power pull, either on free air delivery or against pressures of up to 1". Special models for high temperature and/or corrosive fume applications.

Direct or V-belt types available, in sizes from 24" to 84", or from 4,000 to 90,000 CFM. They're huskily built in the "Buffalo" tradition for long-run performance with practically no maintenance. Get FULL DETAILS TODAY on this new line of "Buffalo" Breezo Fans. You can cash in on sizeable profits by recommending them. Write now.

Send NOW for Complete Data on New "Buffalo" "NV" Propeller Fans

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BELTED VENT SETS
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BELT-AIR FANS
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IMPROVED IN '53

YOU'LL LIKE IT MORE IN '54

NOW . . . . . .

Saves more TIME-EFFORT-MONEY

—— NO NOTCHING ——

NO NUTS • NO BOLTS • NO SCREWS

TO LOCK — JUST FLIP THE FLIPPER • CAN BE USED ON OLD WORK, TOO.

Easiest — Fastest
Most Profitable to Install

Only TWO Adjustable sizes for all installations—12" to 18"—18" to 25", replaces six sizes in your stock.

SAVE SPACE—ORDER TODAY

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Saves TIME TROUBLE MONEY
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SIGNALS and SYSTEMS
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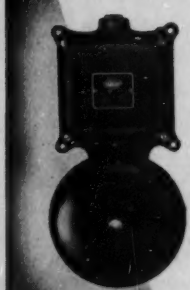
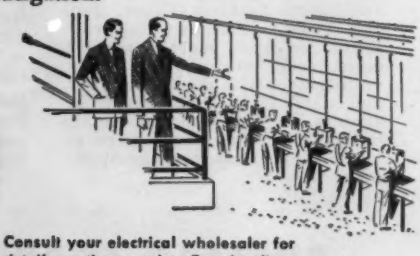
Properly designed and installed signals and systems are real time-savers that smooth out many a plant problem—help stop wasted motion. And solving individual signaling problems has been Faraday's business for *seventy-eight years.* These years of experience assure correct plans, correct installation. To be sure that your signaling system is operating at top efficiency, check with Faraday. No obligation.



NECK-TYPE BELLS

VIBRATING HORNS



Consult your electrical wholesaler for details on the complete Faraday line.

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procedure outlined can be extended to other receivers exhibiting the same or similar characteristics.

Ten separate sections, profusely illustrated, deal with specific categories of service problems such as "intermittents," "hum," "spurious oscillations," "noises," and many others. Each section contains a general discussion outlining procedures for service on receivers exhibiting symptoms covered in that section; thus, the technician can readily apply the specific examples to almost any service problem.

In addition, the index is designed to provide reference, by trouble or symptom, to the case histories. This provides for maximum flexibility in the use of the book, since symptoms exhibited by one receiver are often present in similar receivers and the same remedy may be used.

Recommended Practice for Residence Lighting

Published by Illuminating Engineering Society, 1860 Broadway, New York 23, N. Y. 44 pages, price $1.00.

A completely new standard guide for home lighting, this new 44-page, fully-illustrated practice was prepared by the I.E.S. Committee on Residence Lighting, comprised of home lighting experts from light companies and equipment manufacturers, and results from several years of discussion and study.

The new *I.E.S. Recommended Practice for Residence Lighting* is primarily devoted to the basic lighting requirements for family activities involving close vision, such as the selection and placement of portable lamps for sewing, reading, reading in bed, desk work, piano playing, kitchen and laundry activities. Desirable types of table and floor lamps for such activities are shown, and accurate measurements as to their position with respect to the work and user are given in inches. Types of installed lighting fixtures for living rooms, dining rooms, bedrooms, kitchens and bathrooms with accurate directions for obtaining maximum efficiency and value are included. The report also covers lighting of special areas such as playrooms, closets, porches and outdoor areas. Each of these lighting problems receives full treatment in the 44 pages of text, and most are illustrated to show how the completed lighting job looks. In addition, line drawings give how-to-do-it help on the construction of wall valances and coves for special window effects.

Because interior finishes and their reflectances have a decided influence upon attractiveness, vis-

ual comfort and lighted efficiency in the home, as well as elsewhere, included in this new report is a special feature in the color-chip chart showing a suggested range of 30 colors, and their reflectances, for ceilings, walls and floors. For use with this color chart, a full page of the report deals with the environment which may be created with colors and the effects of light upon them.

Easy-to-use tables contain other information vital to home lighting.

Federal's Selenium Rectifier Handbook

Published by Federal Telephone and Radio Co., 100 Kingsland Rd., Clifton, N. J. 80 pages, price 50 cents.

The design, application, specification and circuitry of selenium rectifiers are described in comprehensive fashion in the second edition of *Federal's Selenium Rectifier Handbook.*

This enlarged edition treats in detail a representative listing of the selenium rectifiers manufactured by Federal for radio and television use. It also covers rectifier designs and power supply circuits for such applications as phonographs, audio amplifiers, amateur radios, mobile radios, photocell amplifiers, intercommunication systems and other DC power supply requirements.

In addition, servicing information for the selenium rectifier is presented in simple, easy to follow form. Trouble-Shooting tables help the serviceman or technician follow proper procedures in checking a rectifier when specific circuit conditions exist, and diagrams are provided for setting up forward and reverse current tests in the repair shop.

The handbook is sectionalized for quick reference, with three major divisions of technical material.

Section I includes dimensional diagrams and physical specifications of the rectifiers; fundamental circuits using selenium rectifiers, separate electrical characteristics and circuit application data for each of the 26 Federal selenium rectifiers listed; and voltage regulation curves for each model.

The 1953 Code

(*Continued from page* 36)

place of the tinsel cords, Types AT and ATJ.

Section 94005 has been completely revised to conform to the new flexible cord standards and also to take cognizance of Inter-

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pretation No. 372 regarding Type EO cable.

Note "a" in the table of Section 94102 will be Note "b". A new note "a" will fill a need for a 250 volt rated candelabra base lampholder for installation on switchboards, etc.

The caption and text of Section 94105c has been revised. The decreased size of the lamp envelopes has made this present rule worthless. This section will now be captioned "Lamp Wattage Marking" and will require each incandescent lamp fixture to be marked to indicate the maximum allowable wattage lamp.

Chap. 10—Tables, Diagrams, Examples

The third heading of Table 1 will be amended to include "Direct Burial."

Under column 4 of Tables 1 and 2 "Type MI" will be added to give this cable the same ratings as for paper insulated cables, etc.

In both columns 2 and 3 of both Tables 1 and 2 the following headings will be added "Type RH-RW, see note 4a."

A new note 4a will be added to Tables 1 and 2 calling attention to the dual rating of Type RH-RW wires.

In column 3 of both Tables 1 and 2 "Type RHW" will be added to the headings.

"AVL" will be deleted from the headings in column 5 of both tables 1 and 2. There is no special need to list this one type of lead sheathed cable and omit all the other types such as RILC, etc.

A new note to Table 1 and 2 will call attention to the fact that the maximum operating temperature of 850C for Type MI cable is fixed by the seal insulating material.

Table 3 will be completely revised to correlate it with the new standard for flexible cords and fixture wires.

A new note 1 will be added to this table warning against the use of cable assemblies which will cause any conductor insulation to be subjected to temperatures in excess of their rated temperatures.

The text to Tables 4 and 9 will be revised to apply to Types RF-2, RFH-2, R, RW, RH-RW, RU, RUH and RUW instead of the rubber covered types shown in the 1951 tables.

In Tables 4 and 5, "5" inch conduit will be shown wherever "4½" inch conduit is now shown in the 1951 tables.

In the footnote to Table 9 reference will also be made to "X-ray control conductors, Section 6607."

All reference to 4½ inch conduit in Table 12 will be deleted.

In Table 13, the heading over columns 2 and 3 will read "Types RF-2, RFH-2, R, RH, RH-RW, RW." The heading over Columns 4 and 5 will read Types TF, T, TW, RU, RUH, RUW."

A new footnote to this table will require the use of column 3 for computing conduit or EMT size for new work, not shown in Table 4 and the use of Column 5 for rewiring of existing raceways.

Table 19 will be deleted.

In Table 20 the heading on Columns 7, 8, 9 and 10 will read "Maximum Allowable Rating of Branch Circuit Fuses." A footnote at the end of the table will refer to Tables 26 and 27 for the setting of branch circuit breakers.

In column 3 opposite the 26 and 28 ampere values shown in column 1, the No. 8 will be changed to No. 10 for Type RH conductors.

A new table 25 will be included in the 1953 Code for conversion of locked rotor currents to HP ratings or vice versa as required by revised Section 4309b.

Table 30 will be deleted.

Table 31 will be completely revised to correlate it with the new UL standard for flexible cords and fixture wires.

Long-range planning

(*Continued from page* 27)

tower lines or modification of those already in use. Sometimes it is a matter of necessity to go underground with high-voltage cable, even though this type of installation usually costs several times that for overhead. Even with underground cable, it may be difficult in some instances to obtain adequate underground rights-of-way because of requirements of other utility services.

In considering future high-voltage circuits, there are a number of factors the system planning engineer should take into consideration. One of the most important is the radio influence of high-voltage conductors on AM radios. The conductor diameter must be great enough to minimize this type of radio interference. One the radio influence problem is solved, the corona problem seems to take a back seat because the conductor diameters are usually large enough to adequately minimize corona loss.

Another factor is the current-carrying ability of transmission conductors. There are some places now where existing high-voltage transmission circuits at 138 kv are not adequate to carry the output of a single new large turbine generator. The planning engineer should look at this carefully and far into the future to be sure that each circuit will carry the maximum desired future load not only on a normal basis but also on an emergency basis.

The planning engineer should very carefully determine what factors influence the installation of the next higher transmission voltage. Some of these factors are short-circuit capacity on existing circuit breakers, the proper relaying of existing circuits, and the number of customers supplied from a given substation. A higher voltage grid will allow existing low-voltage grids to be broken up into smaller operating groups in order to make possible the continued use of existing breakers and to give better selectivity on relaying. The 330-kv grid in the middle eastern part of the United States is an established fact, and will probably grow and extend itself over adjacent areas in the future. Also, there are a number of areas in the United States where 230 kv is being installed for the first time to form a new high-voltage grid above existing voltage levels of 115 and 138 kv.

Although transient and dynamic stability have been discussed many times, some factors that affect future planning should be mentioned. They are: the speeds of relays and breakers, the reactances of equipment and lines, the short-circuit ratio of generators, the WR^2 of rotating equipment, excitation systems, power foctor of operation, the use of high-voltage cables and shunt capacitors, and the proper application of equipment to minimize the extent of faults.

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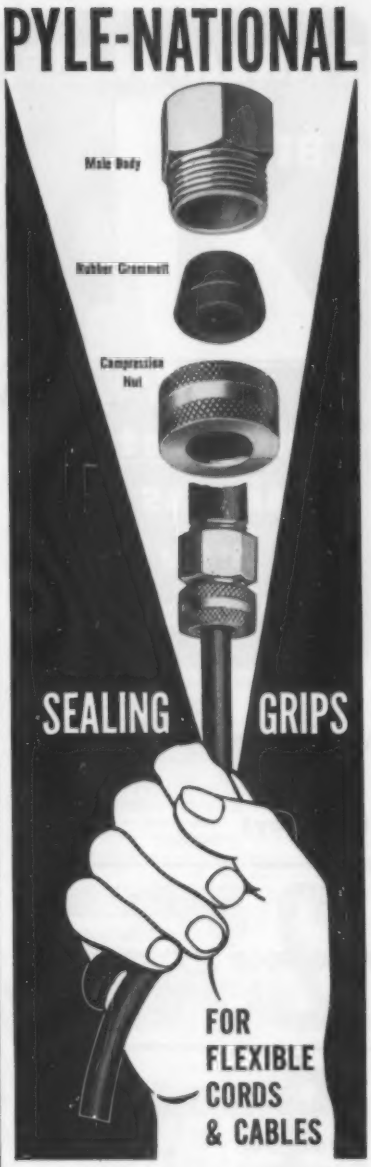

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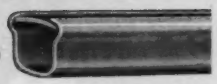
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interrupting capacity are available, 230-kv breakers up to 15 million kva interrupting duty are available, and 330-kv breakers are being manufactured for 25 million kva interrupting capacity.

Power transformers are available with various cooling techniques that have also reduced their weight per unit of rating. The system planning engineer should use minimum standard insulation levels on high-voltage transformers wherever applicable to reduce the investment cost.

High-voltage series capacitors have been applied in 66- and 230-kv circuits to reduce the series inductive reactance of those circuits for various reasons. The installation of future series capacitors in high-voltage transmission lines may have a very definite place in the planner's book of tricks in obtaining the most efficient overall system investment to carry the required loads.

It is possible in many instances to simplify new substations and bulk power stations as far as their layouts and the use of insulators, disconnect switches, etc. are concerned. Perhaps more standardization and prefabrication of component parts would result in a more economical design.

Distribution loads increasing

As mentioned above approximately 50 per cent of your investment is in distribution facilities. As loads continue to increase, many questions arise as to whether or not single-phase or three-phase secondary services should be used, and at what voltage the primary circuits should operate. Both of these questions are controversial, but it is entirely possible that three-phase secondary services will be applied in many areas, particularly where heavy air-conditioning loads have to be supplied. A long-range plan on this part of the system should give a better indication of what the future services should be. Regarding the primary circuits, there is a very definite tendency to go to voltages higher than the 5-kv class in many areas of the country. When this is done, it appears that many of the circuits will carry loads of as high as 10,000 kva and perhaps higher. In this case also the system planning engineer should not only look at voltages in the 15-kv class, but should raise his sights perhaps to the possibility of 25-kv for certain types of distribution.

Distribution is one area of the system in which more standardization could be accomplished. This is particularly true in substation sizes and arrangements. The question might be raised as to why it is not possible to prefabricate the cross-arm structures placed on distribution poles. Why wouldn't it be possible to build the top section of the pole in a central location and put it on a shorter pole set in the ground with a special fitting to join the two together in the field. The connection holding the two sections of pole together could also carry, when necessary, the racks for the distribution secondaries.

Serious study should be given to placing certain types of distribution facilities in certain areas underground. This would improve the appearance of the area, and would certainly be appreciated by the public.

Computer use in planning

The a-c board is now used extensively by practically every power system in the world in planning future systems. Its uses are well known, and will not be reviewed here. However, a rather recent additional use of the a-c board seems to offer great possibilities for future planning and efficient operation of power systems. This concerns the use of the a-c board in conjunction with a digital computer in determining the loss formulas for power systems in order to enable these systems to operate in a more efficient manner.

Loss evaluation studies involving the a-c board and the digital computer are also very important to determine just rates for power flow over interconnections between power systems. In this way interchange power both ways between two systems can use the facilities of each system to the best advantage of both systems.

The digital computer also has another valuable use so far as business operations are concerned. This has the general title of "Operations Research." Using certain techniques and the factors affecting the various parts of your power company operation, predictions can be made on a probability basis for future decisions. By using the digital computer on such studies, a large number of variables can be taken into consideration which, if attempted analytically, would be practically impossible to solve because of the large

number of equations involved.

From a manufacturer's standpoint, it is desirable to have the planning engineer base his future plans on the use of equipment ratings closer to those available from the manufacturers than has been the case on some equipment now in operation. Here again this is a matter of life of material, insulation, etc., and, of course, should be evaluated as far as normal and above normal loadings are concerned.

Atomic power plants

It is believed that a large power plant using atomic power as a source of energy will be built to generate electric power sometime within the foreseeable future. Much work is being done on this now by various groups of users and manufacturers. The important point is that as far as is known at present, the electrical end of such power plants will be similar to those now used on turbine generators. The boiler end of the plant, of course, will be different.

Plant engineers confer

(*Continued from page* 29)

system is negligible.

The advantages of the grounded-neutral system are:

1. Fewer failures of motors and other equipment.
2. Less time required to find grounds.
3. Less interruption to production.
4. Less danger to personnel.

Special electrical fuses

As industrial processes become more automatic, electrical system capacities are increased and continuity of electrical service becomes more important. To protect such systems requires the use of electrical fuses with special characteristics, stated J. C. Lebens, Bussman Mfg. Co.

Abstracts of further comments on fuses made by Mr. Lebens follow:

Under normal operating conditions, electrical current can vary within extremely wide limits without injuring equipment as long as the current is not permitted to flow longer than a predetermined, safe time. If the current is cut off too soon, unnecessary interruptions reduce efficiency of production. On the other hand, if the current is al-

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lowed to continue for too long at over-load, the machine is damaged.

Power fuses rated at 600 volts or less, commonly referred to as low voltage fuses, are commercially available in three basic types: nonrenewable, renewable, and dual-element fuses.

The nonrenewable is the oldest and most common type of low voltage cartridge fuse. It consists of a zinc link surrounded by an arc-quenching filler. This type of fuse has very little time-lag, so that on motor circuits, its capacity must be several times the ampere rating of the motor it is to protect, to eliminate needless blowing on harmless overloads. Hence, there is a range between the full load capacity of the motor and the rating of the fuse in which the motor can be damaged without the fuse blowing. For this reason the principal function of the nonrenewable fuse is to isolate faults and protect against short-circuit currents.

The renewable fuse reduces fuse replacement costs, and can be built with a time-lag so that its rating can more nearly approach the rating of the circuit without needless blow-outs.

The time-lag is obtained by reduced sections or weak spots in the fuse link. At low overloads, these weak spots transfer heat to adjacent zinc lag plates, but at high overloads there is no time for thermal conduction and the fuse blows rapidly.

The dual-element fuse combines a thermal cutout with a fast-acting fuse link. The time-lag possible with dual-element fuses makes it practical to match the time-current characteristic of the fuse to the safe time-current characteristics of the system, so that unnecessary circuit interruptions are eliminated.

The electrical loads in modern industrial plants require large-capacity circuits capable of delivering heavy short-circuit currents under fault conditions. The protective device must clear these short-circuits without creating a hazard. Fuses with sufficient interrupting capacity must be used on such circuits.

Tests conducted on the Fusetron dual-element fuses show that these fuses have interrupting capacity in excess of 100,000 amperes, and that the fuse clears the short-circuit so rapidly that the actual current flowing is held to safe, nominal values.

To complete the protection picture, Hi-Cap fuses which coordinate with the dual-element fuse are now available in sizes from 1,000 to 5,000 amperes. These fuses also have an interrupting capacity in excess of 100,000 amperes.

By using the Hi-Cap fuse in conjunction with the Fusetron dual-element fuse it is now possible to design a completely co-ordinated protection system from the smallest branch circuit fuse to the main fuse with adequate interrupting capacity.

Motor rerating program

W. H. Formhals of the Westinghouse Electric Corp., said that the Motor and Generator Section of the National Electrical Manufacturers Association is engaged in establishing standards in the public interest, and for general use by the electric motor industry. These standards define operating characteristics and dimensions to assist users in the proper selection of motors and generators.

Further comments made by Mr. Formhals in his Conference address are abstracted here:

In the past 25 years there has been no change in frame assignments for the most popular, high production ratings from 1 to 15 hp, except for one minor change in 1940. In this period our technological advances have been such that motors are being built in much larger frame sizes than is necessary.

On November 12, 1952, the N.E.M.A. approved a suggested standard for design of alternating current open-type motors from 1 to 30 hp. Since that time additional standards, including those for enclosed motors and open motors of other speeds have been recommended and approved. The standards are, of course, entirely voluntary.

N.E.M.A. numbering system

The N.E.M.A. system of numbering the frames of integral horsepower motors is as follows:

1. The first two digits of the frame number are equal to four times the dimension from the motor base to the shaft center, in inches. Thus, a 180 diameter motor must have a shaft center height from the motor base (known as the "D" dimension) equal to 18 divided by 4, or 4½ inches.

2. The third digit of the frame number pertains to the distance from the frame center line to the center of the bolt holes in the feet of the motor, measured laterally,

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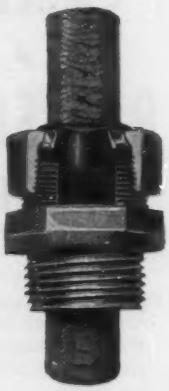

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and is obtained from an approved preferred numbering system chart. Thus, a 182 frame motor must measure 2¼ in. at this point. This is known as the "F" dimension.

The smallest diameter of motor made according to the new standards will be available about January 1, 1954, to be followed at about 5-month intervals by the larger frames. Individual availability dates of all rerated motors will be determined and announced by each motor manufacturer.

Lumber mill robot

(*Continued from page* 25)

115 or any pre-determined figure it cuts off. Shavings from the planer are used as fuel. One motor operates the chain belt that loads the blow pipe and a second motor powers the fan.

Pumping of water, return of condensation, operation of stand-by tank and firing of the boiler are all coordinated from one switchboard using an adaptation of the B & W water control system. One of the most unusual things about this switchboard is that it can be operated manually as well as automatically. Three hand operated units on the lower right hand corner of the board control well pump, water feed system and boiler firing. Any one can be operated by hand without interfering with the automatic operation of others or all can be placed on manual control.

Switch boxes and panels were laid out on mounting board and space requirements determined for front and back. In this case the conduits and connections on the back of the board are unusally complex because all are interlaced and each operation tied in with the hand switch. A neat painting job finishes off an outstanding switchboard.

At the control room of the dry kiln, the same principle was used in arranging another switchboard. Everything in the room is put where the operator can see it. Conduits are placed on the wall and everything using wiring is connected by a conduit. For safety there is nothing overhead to dodge and no pipes on the floor. No wood is used and the installation is as fireproof and foolproof as it is possible to make it. Of particular interest is the use made of colors. The master gauge makes its chart in red, blue and green inks. In painting the interior Bill Coats

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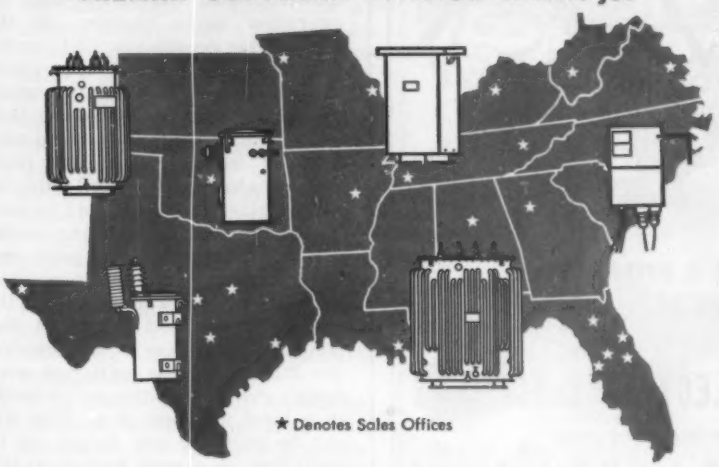

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worked out a scheme of using the three colors of the chart as trim on all controls, each control being marked with the color that its operation helps register on the gauge. This greatly simplifies training of operator and in an emergency it could be worked by an untrained operator following the color scheme.

At lumber mills it is a common practice to use a trough from planer to loading terminal with the planer pushing boards, end to end. To relieve the planer of this pushing load, Bill Coats designed and built two conveyor belt units, each 22 feet long. Each is powered with a 2 hp motor and a "Speed Selector." The conveyor belt serving the loading end is equipped with double cylinder hydraulic lift made in a local machine shop. This lift can be adjusted any height up to eight feet by a push button on the end where workman taking off the boards can easily reach it. Also this conveyor belt can be swung around for stacking lumber from planer into the storage shed.

When Bill Coats got started on his electrically-operated saws and planers he made other improvements that speed up operations, save labor and cut down on accident hazards. He installed a motor driven unit on the profile of his planer and drilled through the iron sidewall of the machine for the cable to keep it out of the way of workmen. The conduit was kept off the floor by drilling through the concrete base. There are no wires or pipes around the entire operation that can interfere with workmen and cause an accident. The shaft on the trim saw was cut in half and an extra motor installed so that saws could be set at a slight angle to prevent binding of lumber as it passed through. From the take off of the resaw he devised and built a trip.

Completely automatic

Regardless of the length of the lumber and regardless of variations in length from piece to piece each is automatically centered and dropped in the right position on the gravity feed that takes lumber to the trimmer. This device saves the labor of two men in handling the take-off from resaw. Electricity was put to use again in furnishing compressed air to operate a foot trip turn table in front of the trimmer saws. This device shoots up under a board so that the operator can spin a board around to reverse ends in a split second.

As to safety work, Mr. Coats puts it this way: "Our policy is to eliminate hazards rather than to train men to try to avoid them. The fewer things a man does the fewer his chances for an accident. Improvements have to be foolproof and adapted to the individual operator. If a workman won't or can't use them, they are useless."

Mr. Coats is a methodical planner who works out his ideas in his head and on paper before starting. Once he starts it, he carries it to completion in every detail and leaves nothing to be finished at a more convenient time. Right now he is working on several other ideas for mechanization and use of electricity.

One thing that anyone contemplating improvements along the lines of those done at Winston Lumber Company should keep in mind is that they are capital expenditure as far as income tax goes. There is no write-off except annual depreciation and this is of little consolation in a business with the economic hazards faced by a lumber mill.

Displaying small items

(*Continued from page* 24)

about locating it on the cabinet drawer face, then pointing it out to the salesperson. This saves a lot of time and in addition, the drawer faces serve to remind the average homeowner of two or three additional items, which he may need. It also makes an effective and simple system for maintaining the inventory. We simply pull out the drawer, note whether a pre-set minimum number of pieces has been reached and re-order as soon as this appears."

From the outset, the "Home Mechanics Counter" as it is also known, has been an impressive success. On Saturdays, from 60 to 70 customers is the average, and around 20 daily through the rest of the week. There is no such thing as "an average sale" of course, inasmuch as few homeowners are in search of the same item. It is an exceptionally "clean business," all cash, and does not involve contractors, builders, electrical repairmen, or other such purchasers. Only once in a while does a customer request credit, and then only if he already has an outstanding account with Hampton Electric Company.

One of the factors which has helped to build the $1500-per-month volume sold by the depart-

ment is the willingness of expert electricians on the staff to instruct homeowners on how to make an electrical installation. "Of course, we do not intrude upon the electrical installation and contracting department," Mr. Vedder smiled. "But where the homeowner is attempting to make a simple repair or new installation which does not conflict with the code, we will spend plenty of time with him assembling the appropriate materials, showing him how to make a splice, or a connection, how to test the installation and the mechanics of putting it in. Naturally, when the customer needs a lot of instruction, this often ties a man up for a considerable length of time. This we accept, however, as a natural element of this type of selling and we believe that it pays off in goodwill. A lot of the increased appliance volume which we have sold during the past year is traceable directly to homeowners who entered the store the first time in search of some small electrical part."

In this connection, it might be well to mention that every service counter customer passes through impressive appliance displays enroute to the counter. Television sales have been helped particularly through the plan.

"In order to operate such a department, the dealer must have full co-operation from his salespeople, a better-than-average background with electrical repairs and installation, and finally, be willing to spend plenty of time with the individual customer," Mr. Vedder summed up. "When these requirements are met, volume can be quite surprising."

Airplane maintenance

(*Continued from page* 21)

mounted on 20-foot centers lengthways of the bay at front and rear for general illumination. The reflectors of both types are connected directly to the wireways, and are mounted squarely with the duct and with the ground, but are larger than standard and of a special shape with a broader and more horizontal inside arc to diffuse and distribute the light downward without glare. The MV lamp transformers are mounted under the main distribution panels inside the building.

Offices and warehouses on upper floors are lighted by conventional fluorescent units, and stairs and hallways by standard incandescent fixtures. In the stock rooms, lights are flexibly mounted directly on ten-foot lengths of National 1700 surface duct, so that the whole "bank" can be quickly moved to a new position simply by moving the hangers. They are cheaper and easier to install quickly, and infinitely more flexible where frequent plant changes are made.

Ramp lights around the edges of the field employ four 1,000-watt bulbs to the bank, and there are 37 banks around the field. Eastern has a Diesel generator and plans an

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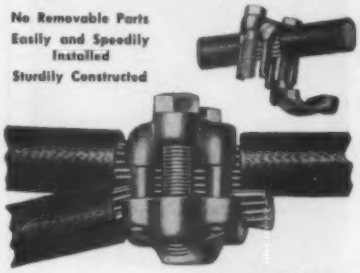

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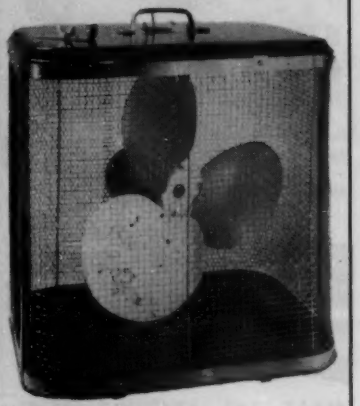

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emergency power set-up, but this is not of primary importance at the moment, as hurricanes so far have been the only cause of public power failure, and at all such times planes are flown out of the area and there is little need for service.

Joe Schmidt says: "Not only the design, but much of the consultative supervision was supplied by Eastern's staff of L. K. Hays, consulting engineer, J. C. Eyres, foreman of electrical maintenance, Ed Hoge, facility engineer, E. H. Steele, building superintendent, Herbert Shartle, resident engineer, and J. H. Brock, EAL vice-president, in charge of erecting the building.

"This experience shows that continuous research will always provide better answers to all electrical problems, with less operating expense and loss of time thereafter. Also that in specialized operations a contractor should work closely with the plant staff, who are really 'living with' their problems and know exactly what they want.

Time limitations imposed

"Our biggest problem on the job was the time factor, as we had only six months for the major part of the wiring. Material was secured partly under priorities, and we had to pile on the help at times, lay out all work to best advantage, and supervise it closely. Our own foreman, Tom Liles, Jr., did a good job, and we also enjoyed fine cooperation from all the electric manufacturers.

"Space problems were not acute, and we also had plenty of storage space, so we could route material and plan work sequence in the most efficient way. We used only routine power tools, such as machine dies, electric drills, and hydraulic benders.

"The most unusual feature of the design was the connecting of many fixtures directly to the wireways, which made a neat, rigid and low cost job. Wireways saved a lot of money on this installation and will continue to do so for the life of the building. The 1200 feet of busway was prefabricated, half in 2,000-amp. and half in 1500-amp. capacities. This duct saved a lot of time and money, too. We saved some time on the contract with the use of rolling scaffolds, instead of step ladders, on the high "bay" work, and electricians were alloted to special jobs according to skill and to the ability to work in high places.

"One of the safety features of the design was the use of expansion joints and copper "braid" connections wherever the busway went through fire walls. These connections "sheer off" in case of extreme heat or strain, and leave the other circuits and departments intact.

"The switch equipment consisted of: one unfused 4,000-amp. main, one unfused 3,000-amp. main, two fused 2,000-amp. and two fused 1,500-amp. sub switches. There were few "bugs" or delays on the job; out of about eight miles of underground pipe, only one section was broken by the heavy surface roller. Some plug-in duct was used in one shop, where it was required to provide d.c. voltage for test machines at varying locations. On the contract our estimate proved to be a sound one, and we were aided by the fact that material prices held steady and labor rates went up

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only slightly during the job."

The diversity of power needs throughout the plant can be understood from a partial list of departments not already mentioned: major-overhaul bays, engine overhaul, engine changing, fabric shop, electric accessories, hydraulics, sheet metal, painting, receiving, supplies, warehouse and fire departments. Eastern is engaged in what amounts to hundreds of complete small businesses, each with specialized electrical needs.

Among the building's electrical and electrically-controlled systems, most of which were designed by Eastern's communications department, are: a private telephone, a two-way public address set-up automatically controlled so that any phone can dial directly into it for paging, a two-way radio phone system to plane tractors, portable gassing units and supervisor's vehicles, master IBM impulse clock, fire alarms, obstruction lights to warn off planes, automatic field and building lights turned on by an electric eye when natural light falls below a certain point, compressed air and cleaning liquid under pressure, and inside 28-volt d.c. system, 26 electric hoists, three freight elevators and an outside dumbwaiter.

Adjustable work stands in the plane service bays are equipped with portable cables and complete outlets for light and power tools, with all receptacles in the bays being explosion proof. Russell and Stoll outlets were chosen for this exacting purpose. This company also supplied power plugs, circuit breakers, conduit fittings, and other items. Suppliers of other materials not already specified were: panels (and wireways), Frank Adams; main switchboards, Cleveland Switchboard Co., with Pringle type switches; wire and cable, General Cable Corp., Triangle Conduit and Cable, and Phelps Dodge Cable Corp.; fluorescent units, Silver Ray Lighting Co.; transformers, Line Material Co.; 1,000-amp., 28-volt, d.c. motor generator and numerous portable units supplying the same type of current, Hobart Brothers Co.

Among materials used were: about 250,000 feet (over 46 miles) of copper wire in various sizes, 39,000 feet of underground conduit, roughly 5,600 lighting fixtures, 8,000 four-foot lengths of fluorescent tubing, and 187 floodlights.

The end product of Eastern's expansion is proving highly satisfactory to the airline. The company has a clear-cut philosophy of steadily achieving greater air efficiency through a combination of individual enterprise and teamwork. Everybody at Eastern, on the lot and in the air, seems to feel that his primary aim is sound public service. The plane and building maintenance staffs, while not contacting the public directly, are obviously geared to go "all out" in serving those who do. The new building and electrical facilities enable them to still help all hands improve and expedite every detail of that service still more.

The staff plainly show in their planning and operations that one of the central, continuous factors in this broad service is the ability of the new and more flexible electrical system to deliver precisely the kind and amount of light and power needed to the exact spots where it's required. This the modern electrical industry has been able to do through proper design, materials and know-how.

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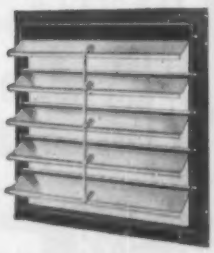

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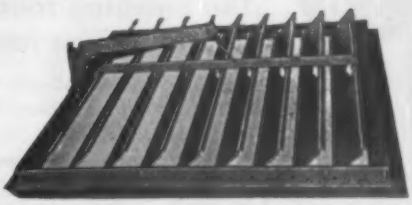

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All manuscripts and news material relating to the merchandising of household appliances, radio-TV, etc., should now be mailed to the editors of *Southern Appliances*, rather than to ELECTRICAL SOUTH.

Editorial contributions in the form of feature articles, interesting photographs, and news material are wanted for ELECTRICAL SOUTH, and these should be mailed to the attention of the Editor, ELECTRICAL SOUTH, 806 Peachtree St., NE, Atlanta 5, Ga.

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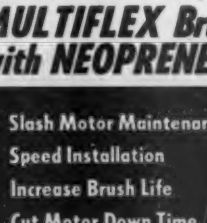

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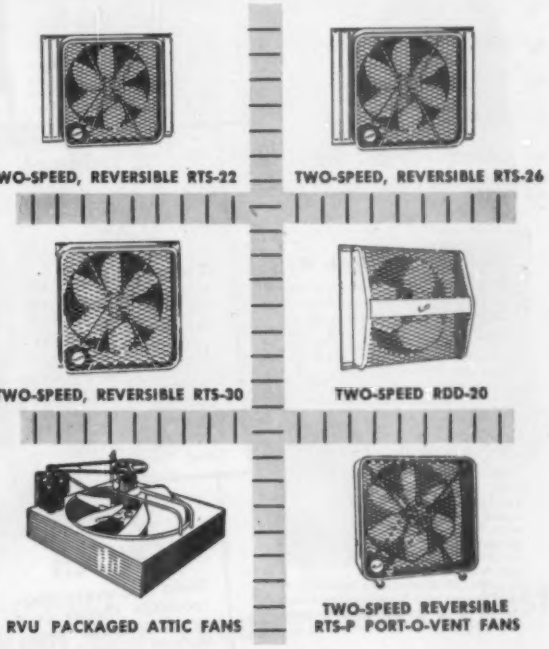

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